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INTERCITY BUS DESIGNS - A ROUTE TO THE FUTURE

HICKLING-PARTNERS INC.

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17. Abstract

As a result of several previous studies on intercity bus equipment, Transport Canada contracted for a market study of the potential for higher capacity buses in North America. This study reviewed the basic economics of such a bus and the operational advantages and problems posed by the introduction of alternative configurations. Furthermore, it attempted to ascertain any market preference in terms of the physical attributes of the design alternatives. Most of the market intelligence was gathered either from existing reports in both Canada and the United States or through a series of industry executive interviews undertaken as part of the project.

A database on bus demographics was created which identified the type of service and number of buses operated by each carrier in North America. Forecasts were developed for passenger demand and total coach sales through to 1990.

The results of this study indicated a small market for higher capacity buses which could reach a maximum of 520 units in operation within the next ten years. The broad range of 40-520 estimated sales was further segmented into three subgroups; base (40-100 units), probable (100-300 units) and possible (300-520 units). These coaches would likely be used in high density linehaul situations. The preference for physical configuration (either articulated or double-decker) was not strong; however, there was a slight preference towards double-decked units because operators perceive that they would have greater passenger appeal.

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17. Résumé

Les diverses études faites antérieurement sur les autobus destinés aux liaisons intervilles ont amené Transports Canada à parrainer une étude de marché visant à déterminer le potentiel qu'offre l'autobus grande capacité dans ce type d'utilisation en Amérique du Nord. Cette étude a examiné la productivité de cet autobus et a passé en revue les avantages et les inconvénients qu'il possède en exploitation sous l'une ou l'autre des diverses configurations possibles. En outre, elle a tenté de vérifier s'il existe une préférence marquée pour une architecture en particulier. La plupart des données de cette étude ont été tirées des nombreux rapports consacrés à ce sujet, tant au Canada qu'aux Etats-Unis, ou bien elles ont été obtenues lors d'entrevues avec des représentants des milieux industriels intéressés.

L'étude a établi une base de données qui recense les catégories de service offertes par les transporteurs nord-américains et le nombre d'autobus affectés par eux à chacune d'elles. Elle a aussi établi des prévisions jusqu'en 1990 sur le nombre total d'autobus qui seraient vendus et sur la demande de transport.

L'étude de marché a mis en évidence un marché restreint pour l'autobus grande capacité, à savoir un maximum de 520 au cours des dix prochaines années, probablement en service régulier sur axes lourds. La quantité de véhicules pouvant être absorbés par le marché, soit entre 40 et 520, a été subdivisée en trois sous-groupes distincts: quantité sûre (de 40 à 100), quantité probable (de 100 à 300) et quantité possible (de 300 à 520). Aucune préférence marquée n'a été décelée quant à l'architecture: autobus articulé ou à impériale, sauf que les transporteurs semblent percevoir une légère préférence de la clientèle pour l'autobus à impériale.

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INTERCITY BUS DESIGNS
- A ROUTE TO THE FUTURE -

FOR

TRANSPORTATION DEVELOPMENT CENTRE

BY

HICKLING-PARTNERS INC.

JANUARY, 1983

The contents of this report reflect the views of the contractor and not necessarily the official views or policies of the Transportation Development Centre.

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PROJECT TEAM

The project team for Hickling-Partners Inc. was composed of:

Gordon Taylor, Partner
John McMullen, Senior Consultant

SUMMARY

1.0 BACKGROUND

Over the last four years, the Transportation Development Centre has been involved in several projects aimed at analyzing and demonstrating the potential application of higher capacity intercity buses. These projects have included:

- a study of the economic feasibility of higher capacity buses;
- the initiation of the development by Prevost Car Inc. of an articulated bus;
- the demonstration by Voyageur Enterprises of an imported Neoplan articulated coach;
- the analysis and demonstration by Pacific Coach Lines of a double-decker bus.

To date, this activity has led to the development of a Canadian articulated intercity coach, the demonstration of its operational feasibility in high density corridor routes, and the requirements definition for a double-decker coach.

2.0 OBJECTIVE

In all of the above work, there has been no concerted attempt to identify the market for high capacity buses in North America and the factors that may limit their market entry. The objectives of this study, therefore, were to:

- profile the existing North American intercity bus market, and forecast the market demand through the 1980's.

- determine whether there is a high capacity design preference;

- identify, in qualitative and quantitative terms, the likely size and penetration of these markets;

- document the economic, regulatory and operational limitations to their introduction.

3.0 APPROACH

The study team's methodology combined a review of existing literature and statistical data on the intercity bus industry and a survey of operators and other involved parties by means of personal, indepth interviews.

Data covering the much larger U.S. market is more detailed and descriptive, and therefore tends to be used throughout the study as representative of the North American intercity bus industry as a whole.

The market survey consisted of eighteen indepth interviews and numerous other contacts with industry representatives. Although not quantitative, the survey provided valuable insight into the present market and operations, carrier preferences with respect to coach configurations, and limitations to the introduction of higher capacity buses. Furthermore, the analysis of the literature, data, and survey findings permitted an objective projection of the future of the intercity bus market, a definition of probable site-specific markets, or niches, for the use of high capacity buses, and a "best estimate" of the size of this high capacity intercity bus market.

4.0 MARKET PROFILE

Expressed in terms of passenger kilometres, the North American intercity bus industry's share of the total intercity passenger market has declined over past years, leveling off at 1.6% in the U.S. in 1978. The automobile with approximately 85% of passenger kilometres in the U.S., has continued to dominate intercity travel, while air has grown significantly from 4% in 1960 to 12.3% in 1978. Rail captures only 0.7% of the U.S. demand.

The number of intercity passengers carried by bus in both the U.S. and Canada has remained relatively stable in absolute terms at 365 million and 33.3 million, respectively. However, the relative mix of "products" has changed within the total intercity bus service. The percent of revenues contributed by scheduled route service has declined, while charter/tour operations have exhibited growth, especially in the U.S. Bus parcel express (BPX) has increased in importance as a profitable revenue generator.

The North American intercity bus market has been fashioned by the prevailing, restrictive regulatory environment. This has produced an oligopolistic market structure wherein a relatively few Class I U.S. and Class I and II Canadian operators account for the majority of the intercity business and, even more so, of the scheduled service. In the final analysis, the industry is dominated by two operators; these are Greyhound Lines (including Greyhound Canada) and Trailways. In Canada, Greyhound accounts for 26% of Class I and II carrier revenues and is the only carrier to operate in more than two provinces. In the U.S., Greyhound accounts for approximately 42% of total intercity bus industry revenues, while the National Trailways Bus System accounts for approximately 22% of revenues.

In the U.S., the regulatory environment changes significantly with the passing of the Bus Regulatory Reform Act of 1982. This Act greatly eases the entry of new operators into the market and also makes it easier for regular route operators to reduce or eliminate service on unprofitable routes.

The bus manufacturing industry is likewise concentrated in the hands of a few. Ranked in order of production, the manufacturers are Motor Coach

Industries (owned by Greyhound), Eagle (owned by Trailways), and Prévost. Total plant capacity for the three is approximately 4,000 buses per year, although actual production at the moment is in the vicinity of 2,200 buses.

5.0 INDUSTRY SURVEY

Due to the ease of entry afforded by the Bus Regulatory Reform Act of 1982, it is assumed that there will be an increase in the number of operators. This increase will be concentrated in the charter/tour market rather than scheduled service because the charter/tour market lends itself to easier entry of new operators with small fleets, whereas scheduled service requires a larger scope of operations and costs and presents stiffer competition. Moreover, scheduled service operators will likely be the first to take advantage of the easing of exit regulations in order to improve system profitability. Further, some scheduled operators appear to be pulling out of the charter/tour service, leaving this sector to the entrepreneurs.

The net effect of regulatory reform upon the demand for new buses may be that the additions and deletions noted above will discount each other. Generally speaking, the smaller charter/tour operators entering the market tend to buy used but well-maintained equipment. It is the larger carriers who account for the bulk of new vehicle purchases.

Throughout the system, average load factors on scheduled service have remained relatively unchanged, hovering at 44-47% of capacity in the U.S., and perhaps 40% in Canada. Consistently high density departure routes, such as those operated by Voyageur, are the exception, rather than the rule. High density routes serviced by the carriers interviewed are characterized by fluctuations in loadings and, therefore, an inconsistent demand for extra section buses. More importantly, the carriers demonstrated a definite preference to increase frequency (number of scheduled departures) and, therefore, provide improved customer service rather than add extra sections.

6.0 COST ANALYSIS OF ALTERNATIVE BUSES

An incremental demand analysis model was employed which allows the comparison of a base-line conventional bus and an alternative design bus based upon their absolute and percentage cost differences as passenger volumes increase.

The incremental demand analysis indicates that significant cost savings may be achieved at certain specific passenger demand levels. Futhermore, the analysis indicates that larger operators (with fleets in excess of 100 coaches, and unionized employees) will be more likely to benefit from higher capacity equipment because of their higher fixed costs of operation and the likelihood that they will experience higher passenger demand levels. The cost structure of the larger operators allows them to have a somewhat lower "risk" of losing money while their gains in the second section are higher than the smaller operator.

The economics of higher capacity buses and the potential for market penetration will improve if the capital and maintenance cost components can be improved (i.e., reduced). However, countering this economic acceptance will be the desire for operators to increase departure frequency, rather than increase capacity on an already established departure, in order to increase demand as opposed to decreasing costs.

7.0 MARKET PROJECTION

The demand for intercity bus travel, expressed in terms of passengers, will remain flat and the industry therefore will lose market share. This outlook is based upon the consideration of:

- **passenger age** - a shift from younger to older passengers as population demographics change, but no net effect on total number of passengers;

- **fuel prices** - despite fuel price increases, the automobile will continue to dominate intercity travel. There is little cross-elasticity; increases in fuel prices do not give rise to increased bus usage.

- **real income** - intercity bus travel is unlikely to benefit from a weak economy. Demand for bus travel is both price-elastic and income-elastic.

Increases in fuel prices, changes in the average age of the population, and the general economic outlook are not expected, therefore, to favour the bus mode. Neither will improvements in service levels or deregulation have noticeable effects upon ridership in the forseeable future. This outlook is likely to change only if there are significant modifications in government subsidy policies, a severe recession, severe shortage of fuel or sharp increases in fuel prices, drastic fare reductions, and dramatic improvements in bus facilities and service quality.

There are two possible scenarios depicting the demand for intercity coaches, both of which start with a given 1982 base of approximately 2,200 units sold. The first scenario forecasts annual new coach sales of 2,000 to continue through the 1980's and is premised upon the consideration of:

- projected 1982 reduced coach sales;
- forecasted flat passenger demand;
- minimal net effect of deregulation in the U.S. upon new bus sales.

The alternative scenario is one of maximum sales of 2,300 buses per year and assumes:

- an easing of the wait-and-see attitude surrounding deregulation;

- a marginal net increase in total passenger volume arising from the growth in the charter/tour segment;

- a decline and stabilization of interest rates.

8.0 POTENTIAL MARKETS FOR HIGH CAPACITY BUSES

The alternative design configurations which were considered in this study are:

- conventional 12^2m coach;
- articulated coach;
- double-decker coach;
- jumbo articulated double-decker coach.

As far as a design preference is concerned, the operators have a strong preference for the conventional 12^2m intercity coach. This preference is based upon:

- relative cost advantage per seat;
- flexibility to re-assign a coach within a given service;
- flexibility to assign a coach to different services (e.g., from scheduled to charter);
- flexibility to add or delete sections as required;
- equipment standardization and the perceived benefits this has for maintenance and repair.

An identification of the carriers' preference among the alternative high capacity design buses available is, at best, subjective due to the size and nature of the survey conducted. However, there were some indications of a preference for the double-decker bus. (It should be noted that these comments came from operators who stated that they would not use a high capacity bus, as well as from operators who indicated that they would use such a bus.) Features of the double-decker bus that were regarded as preferable include:

- a suspected customer preference for the double-decker bus (e.g., for reasons of novelty, sitting on the top deck, etc.);
- the visual promotional aspects afforded the operator by the configuration of the double-decker bus;
- its potential application to the short and medium distance charter/tour operations;
- the perceived better driveability and stability of the double-decker bus. (note that this is also "assumed" inasmuch as virtually none of the respondents has had first-hand experience).

However, there were many more reasons given by the carriers as to why any high capacity bus would not succeed in penetrating the market. To a large extent, these were the converse of the reasons given in favour of the conventional bus, and included:

- lack of flexibility in being able to switch within a given service or between services;
- desire on the part of operators for frequency rather than capacity accommodation;
- perceived higher maintenance and repair costs of a higher capacity bus and the impact upon facilities.
- deterrent of the perceived high capital cost outlay and the uncertainty of resale value;
- regard for past attempts and failures to introduce new designs;

- concern for inadequate customer service attention by the manufacturer of such a non-uniform bus;

- concern for road physical limitations (i.e., overpass heights and power and phone lines).

9.0 MARKET SIZE

In the absence of a more precise and quantitative identification of the probable market size for high capacity buses, a "best-estimate" was made using these operational charactertistics to limit or "filter" the composition of the probable market. By filtering for operators who are:

- of a sufficient size,
- who have routes with consistently high annual departure densities,
- who have sufficient system integration, and
- who would opt for capacity accommodation as opposed to an increased frequency of departures.

It is estimated that within the projected North American intercity bus fleet of 23,000 vehicles (static through to 1990), there is a market for between 40-520 high capacity coaches.

This wide range may be further divided into three major groups based upon the probability of attaining those sales. The three divisions are defined as follows:

- **Base** - the new bus is more costly per seat than current equipment
  - the product is of acceptable design;
  - total industry demand is flat;
  - the carriers are operating with limited resources and low profits;
  - there is limited experimentation and demonstration by operators.

- **Probable** - factors are a blend of base and possible.
- **Possible** - the bus has the same as, or a lower cost per seat than a conventional bus;
  - the product is considered to be above average;
  - the industry is growing in size;
  - the carriers are financially healthy;
  - there is a willingness to experiment with new options;
  - the bus supplier has a high quality service network.

Given these market conditions, the following sales volumes could then be achieved over the first 5-10 years of production:

Base - 40 to 100 units
Probable - 100 to 300 units
Possible - 300 to 520 units

The manner in which high capacity buses will penetrate this market will be site-specific and, therefore, there will be market niches rather than generalized markets per se. Potential customers may be charactertized as:

- scheduled service operators with high volume, high load factor routes which frequently require extra sections, e.g., Voyageur and Pacific Coach Lines.
- charter/tour operators with consistently high year round group sizes in excess of 47 passengers and who provide short to middle distance tours in the middle to upper price range, e.g., Florida/California tour operators to major sites.
- suburban commuter operators who have regular passenger loads which can support the operating costs of a high capacity bus and who, because of fare structures and revenue, are not restricted to running used highway coaches, e.g., GO Transit.

These markets are dispersed and will be relatively slow to develop due to an "other guy first" attitude. Therefore, sales can be expected to be slow unless a major demonstration of the equipment is undertaken and the results widely published. With favourable results, a 50% penetration of the total potential market (20-260 units in total) is possible within four years of product introduction. Without the pilot demonstration, these sales could be delayed for up to three years.

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1.0 INTRODUCTION

1.1 BACKGROUND

Over the last four years, the Transportation Development Centre has been involved in a variety of projects which have been aimed at analyzing and demonstrating the potential application of higher capacity buses in the intercity coach industry. This work was first begun by an economic analysis report entitled "A Feasibility Study of the Introduction of Larger Capacity Intercity Buses" (TP 2053). This study, which analyzed Voyageur's route system, concluded that larger capacity coaches could be economically beneficial to operators who have high density routes which require extensive use of extra-section coaches. This report stimulated several other undertakings by the private sector and by Transport Canada.

Shortly after the completion of the initial report, Prévost Car Inc. applied for and subsequently received an Enterprise Development Program grant to undertake the development of a new, articulated coach for sale in North America. At the present time, the design stage of this coach has been completed, and the coach has been tested at the Transport Canada Motor Vehicle Test Centre in Blainville.

Just prior to Prévost starting their design development, the Transportation Development Centre entered into a joint demonstration program with Voyageur Enterprises for the demonstration of an articulated intercity coach. This coach, which was imported from Germany, was manufactured by Neoplan and, after over a year of shakedown testing, was put into revenue service in November, 1981. The results of this demonstration were intended to identify specific operational problems which may arise as a result of the continued use of higher capacity coaches, as well as any design faults with the specific Neoplan equipment.

In late 1980, Pacific Coach Lines approached Transport Canada to fund an analysis of their high density route between Vancouver and Victoria. The work undertaken under that contract resulted in the definition of a need for a double-deck coach whose design would be an improvement upon that of the existing double-deck coaches.

The net result of the work to date has been the partial development of a Canadian articulated intercity coach and the requirements definition for a double-deck intercity coach. However, none of the published work has attempted to identify the extent to which these coaches could penetrate the existing intercity bus market, or what constraints there may be in the North American market to such equipment.

Therefore, this study was designed to provide preliminary answers to several questions concerning the future of higher capacity equipment in the intercity bus industry. The objectives were:

- the compilation of a statistical profile of the North American bus industy;
- a forecast of both passenger market demand and bus sales through 1990;
- the development of quantitative and qualitative market intelligence on the acceptance of higher capacity coaches;
- an assessment of the likely penetration of higher capacity coaches into conventional intercity bus operations;
- the identification of likely first markets for higher capacity coaches;
- the documentation of economic, legislative and operational hurdles which will have to be overcome in order that higher capacity coaches can gain a market share in North America.

1.2 APPROACH

In order to satisfy the study objectives, the team chose to undertake a review of existing literature which has analyzed the intercity bus industry in North America. However, it was also realized that the extent of this information was very limited, as the industry is basically an oligopoly and, thus, much of the market intelligence information is closely guarded. In order to increase the extent of industrial intelligence, the study team undertook extensive interviews with operators and regulators throughout America.

These interviews were intended to develop an indicator data base for operational characterization, and to compile attitudinal information from the managers who make the buy/sell decisions within operating companies. As the study was a forecasting exercise, much of the questionnaire was designed to be open-ended in nature, thus allowing the interviewee the freedom to discuss areas which he felt to be important while allowing the interviewers the capability of covering most of the topics which were required to compile a data base.

The results of these interviews and available statistical data were compiled; then estimates of the future of the overall intercity bus market and, in particular, the possible role that higher capacity buses may play in that future were developed.

1.3 REPORT STRUCTURE

This report is divided into five principal chapters following this introduction.

The second chapter profiles the existing North American intercity bus market and provides information on the types and volume of services provided, the market structures and a short profile on the equipment suppliers.

The next chapter contains the results of the interview survey undertaken with the operating companies, and qualitative intelligence information concerning their attitudes towards innovation.

The fourth chapter presents a comparative cost analysis of conventional and alternative bus configurations and economics. This work is based on an incremental cost analysis model developed for the previous high capacity bus study.

The fifth chapter discusses the likely future for intercity bus transportation, both in terms of passenger demand and bus equipment requirements.

The final chapter discusses the possible role for high capacity buses and their likely penetration into market niches which may be developed in the future.

A set of three appendices are provided which contain, in order:

- survey questionnaires,
- survey respondent list,
- cost model outputs.

2.0 NORTH AMERICAN INTERCITY BUS MARKET PROFILE

In order to project the future of the intercity bus market---and subsequently, to determine whether there are markets for higher capacity buses---we must first establish a base of departure. In this chapter, therefore, we will present a profile of the existing North American intercity bus market. Included in this profile will be:

- an overview of the intercity bus service and the "product-lines" falling under that general heading;
- an analysis of the carriers, or supply side of the market, with emphasis upon the concentration to be found within the market structure; and
- an analysis of the manufacturers who supply the highway motor coaches employed by the carriers.

This profile, combined with an analysis of economic, regulatory and other factors affecting the industry's growth, and with the findings derived from the survey of carriers and others involved in the industry, will allow an attempt at forecasting of the intercity bus market through 1990 and, more specifically, to make an estimate of potential markets for higher capacity buses.

2.1 INTERCITY SERVICE PROFILE

It is altogether too simplistic to define the intercity bus market as that passenger mode requiring the use of highway motor coaches. Such a general description serves only to draw the distinction between the intercity market and its urban counterpart. Within the basic intercity "product," there are several "product-line" variations. An understanding of these variations and, more importantly, an understanding of their differences -- the factors which effect their relative market shares and growth patterns, etc. -- is essential if potential segments for higher capacity buses are to be determined.

For the purposes of this study, we are primarily concerned with:

- intercity scheduled or regular route service. In Canada, both inter and intraprovincial are amalgamated under the "intercity" heading. In the U.S., interstate service is equated with intercity movement, whereas intrastate is referred to separately as "local" service. Local service also includes suburban commuter traffic.

- charter and tour services. In the U.S. these are often referred to as charter and special services.

Another increasingly significant sub-market of intercity service is package express. However, inasmuch as we are concerned with bus designs vis à vis passenger capacity, this element of the business will be largely ignored for study purposes.

Before turning to a review of these service types, let us first look at the intercity market in total.

The bus industry's share of the total intercity passenger market peaked during WW II, due largely to gas rationing and transport of servicemen, reaching a high in the U.S. of 8.8% of intercity passenger kilometres travelled. Since then, however, the market share has declined progressively, bottoming out at approximately 1.6% of intercity passenger kilometres in the U.S. The latest figure for the Canadian intercity market is 7.2% of total intercity passenger kilometres.

Factors which gave rise to this decline of market share include the elimination of gas rationing and of required transport of military personnel, combined with the continued penetration of the private automobile and the evolution of the air mode. As for the difference between the Canadian and U.S. percentage of passenger kilometres accounted for by the bus mode, it is important to note that the U.S. intercity data incudes commuter trips, whereas Canadian data includes only intercity trips.

Table 2.1 further illustrates the difference in passenger kilometres, in the U.S., between alternative modes of intercity travel. A similar breakdown between modes for the Canadian intercity passenger market is presented in Table 2.2; this is only a snapshot in time due to the unavailability of passenger kilometres statistics for the Canadian intercity market.

TABLE 2.1: INTERCITY TRAVEL BY MODE - UNITED STATES

	TOTAL		AUTO		BUS		AIR		RAIL	
Year	P-km*	%	P-km	%	P-km	%	P-km	%	P-km	%*
1950	812.4	100	705.4	86.8	36.5	4.5	15.0	1.8	52.3	6.5
1955	1,146.6	100	1,025.8	89.5	35.2	3.1	34.3	3.0	46.2	4.0
1960	1,261.2	100	1,136.3	90.1	31.1	2.5	51.0	4.0	34.8	2.8
1965	1,481.0	100	1,315.9	88.8	38.3	2.6	86.4	5.9	28.3	1.9
1970	1,906.7	100	1,651.1	86.6	40.7	2.1	176.2	9.3	17.5	0.9
1971	1,978.5	100	1,723.6	87.1	41.0	2.1	178.1	9.0	14.3	0.7
1972	2,092.6	100	1,816.9	86.8	41.2	2.0	197.9	9.4	14.0	0.7
1973	2,170.6	100	1,876.4	86.4	42.5	2.0	213.1	9.8	14.9	0.7
1974	2,026.8	100	1,723.6	85.0	44.6	2.2	217.9	10.8	16.7	0.8
1975	2,109.0	100	1,807.2	85.8	40.9	1.9	220.3	10.4	16.3	0.8
1976	2,237.2	100	1,910.2	85.4	40.4	1.8	245.1	11.0	16.4	0.7
1977	2,327.4	100	2,005.0	85.4	41.4	1.8	264.2	11.3	16.7	0.7
1978	2,461.4	100	2,099.3	84.6	40.9	1.6	304.3	12.3	16.9	0.7

Note: Figures may not total 100 because of rounding.
* In billions of passenger kilometres.
** Includes commuter trips.
Source: Transportation Association of America, Transportation Facts and Trends, July 1979, p.18.

TABLE 2.2: INTERCITY TRAVEL BY MODE - CANADA (1975)

MODE	P-km*	%
Automobile	30.4	56.6
Bus	3.9	7.2
Air	15.8	29.3
Rail	3.7	6.9
TOTAL	53.8	100.0

* In billions of passenger kilometres.

Source: Canadian Transport Commission, Intercity Passenger Transport in Canada, 1976, p. 3.

At present, the intercity bus industry appears to be holding its own, running at a service level of between 350-400 million passengers per year in the U.S. and 32-35 million in Canada. This is in marked contrast to the increase in air travel. Intercity passengers carried by public carriers (air, bus, and rail) are shown below for both countries in Table 2.3 and Table 2.4.

TABLE 2.3: U.S. INTERCITY PASSENGERS - PUBLIC CARRIERS*

YEAR	TOTAL	AIR**	BUS	RAIL***
1960	545.0	56.8	366.0	122.7
1965	577.0	92.7	378.0	106.3
1970	633.9	155.0	401.0	77.9
1975	619.0	191.1	354.0	73.9
1976	637.4	209.6	350.0	77.8
1977	631.0	225.9	328.0	77.1
1978	659.7	257.0	338.0	64.7
1979	725.0	295.2	368.0	70.8
1980	-	-	365.0	-

* Values in millions of passengers
** Domestic certificated
*** Excludes commuter rail

Source: Transportation Association of America, Transportation Facts and Trends, July, 1979, and updated with: U.S. Department of Transportation, National Transportation Statistics, Sept. 1981; and American Bus Association, Bus Facts, 1982 Edition.

TABLE 2.4: CANADIAN INTERCITY PASSENGERS - PUBLIC CARRIERS

YEAR	TOTAL*	AIR	BUS**	RAIL
1973	—	9.1	-	5.1
1974	48.3	10.1	32.4	5.8
1975	50.4	10.4	34.9	5.1
1976	48.9	10.4	33.2	5.3
1977	49.3	10.3	33.4	5.6
1978	50.3	11.5	33.1	5.7
1979	-	13.0	33.7	-
1980	-	-	33.3	-

* Values in millions
** Class I and II carriers with revenue over $500,000

Sources: (rail and air) Statistics Canada, Travel, Tourism and Outdoor Recreation, A Statistical Digest, May, 1981, and (bus) Statistics Canada, Passenger Bus and Urban Transit Statistics.

In terms of the product-line composition, or services, of the intercity bus market, there have been noticeable changes during recent years. Expressed as a percentage of total intercity bus revenues, regular (i.e., scheduled) service has declined, whereas charter and tour business has been on the increase. With relatively stable total passenger levels, this change in the distribution of revenues translates into an increased number of charter/tour passengers, and a declining number of scheduled service passengers. Again, this is most apparent when the U.S. market is reviewed.

Table 2.5 shows a progressive decline in U.S. intercity regular route service, from 76.6% of total revenues in 1960 to 67.7% in 1980, compared to charter and special (i.e., tour), which has risen from 7.8% to 14.6% of total revenue over the same period. In the same period, package express has also increased in importance (7% to 14.6%) compared to the intercity bus market.

TABLE 2.5: U.S. PERCENTAGE DISTRIBUTION OF OPERATING REVENUES
(Class I Carriers)

SERVICE	1960	1965	1970	1976	1979	1980
Intercity Regular	76.6%	74.6%	70.8%	64.8%	66.0%	67.7%
Local	5.1	2.2	1.8	1.2	.7	.7
Charter and Special	7.8	10.6	11.1	16.3	15.1	14.6
Package	7.0	10.0	14.2	15.2	15.8	14.6
Other	2.8	2.5	2.1	2.4	2.4	2.3

Note: Despite classification changes in terms of what constitutes a Class I carrier the distribution of revenue illustrated is valid.

Source: Interstate Commerce Commission, The Intercity Bus Industry; A Preliminary Study, May, 1978, p. 46, and updated by American Bus Association, Bus Facts, 1981 Edition.

The U.S. market displays greater shifts in the percentage distribution of revenues and, therefore, in the change in market share as accounted for by each service, than does the smaller Canadian market profiled in Table 2.6. However, over a period of only 5 years, a minor downward trend in Canadian intercity regular service is visible, with an equally minor and corresponding increase in charter and tour business (BPX revenue is buried in "other services," although an increase is assumed).

TABLE 2.6: CANADIAN PERCENTAGE DISTRIBUTION OF OPERATING REVENUES
(Class I and 2 Carriers)

SERVICE	1976*	1977	1978	1979	1980
Intercity Regular	67.0%	66.2%	67.0%	64.9%	64.2%
Suburban/Local	0.6	0.5	0.5	0.5	0.1
Charter and Tours	9.4	10.4	9.8	10.2	10.1
Other Services	23.0	23.0	22.7	24.4	25.7

*Note: Differences in carrier classification and report format prior to 1976 precludes presentation of data for earlier years.

Source: Adapted from Statistics Canada, Passenger Bus and Urban Transit Statistics, years 1976-1980.

2.3 CARRIER PROFILES

On both sides of the border, and especially in the U.S., dominance of the intercity bus market rests in the hands of a few carriers. Furthermore, the bulk of available information is derived from these larger carriers, whether it be Class I carrier statistics from the U.S. Interstate Commerce Commission (ICC), or Class I and II from Statistics Canada. Therefore, this data is conveniently (and often unavoidably) used as being representative of the intercity bus market as a whole. To illustrate this high level of concentration, we will look first at Canadian carriers and then at their U.S. counterparts.

2.2.1 Canadian Carriers

In Canada, there are 19 Class I and II carriers with annual revenue of over $2,000,000 and $500,000 respectively, and whose primary source of revenue is scheduled/regular intercity service. They account for 35% of the total number of scheduled service carriers, but 98% of the corresponding revenues. Overall, these 19 carriers serve in excess of 3,400 communities, coast to coast. (Table 2.7 summarizes the relevant data for Canadian intercity carriers.)

TABLE 2.7: CANADIAN INTERCITY BUS INDUSTRY, 1980

	TOTAL	REVENUE CLASS		
CHARACTERISTIC	1980	I & II*	III	IV & 0
Establishments	54	19 (35%)	15	20
Total Operating Revenues ($000's)	$270,438	$265,607 (98.2%)	$3946	$885
Total Operating Expenses ($000's)	$254,891	$250,316 (98.2%)	$3818	$756
Number of Employees	5,816	5,612 (96.5%)	150	54
Fare Passengers Carried ($000's)	33,282	32,846 (98.7%)	437	-
Equipment-Highway	1,424	1,329	28	17
Urban and Suburban	348	337	5	6
School Bus	62	33	20	9
Other Equipment	8	2	1	5
Total	1,842	1,701 (92.3%)	104	37

* Classes I and II data expressed as percentage of total.

Source: adapted from Statistics Canada, Passenger Bus and Urban Transit Statistics, 1980, p.17

With the exception of Greyhound, the 19 Class I and II intercity carriers are regional in scope. They operate in a tightly regulated environment, with each province maintaining a board whose mandate is to review and/or set fares, issue licences, and determine frequency, extension and/or termination of services. The net result is exclusive franchises for the carriers to serve select, regional markets. Long-distance travel is handled through interlining agreements.

Canadian intercity bus market statistics are tabulated and presented in a format which is designed to protect confidentiality but which also, unfortunately, makes it difficult to analyze carrier operations in detail. However, it is estimated that Greyhound Canada, the only carrier to have scheduled services in more than two provinces, accounts for 26% of Class I and Class II carrier revenues.[1]

The majority of Class I and II carriers, their approximate route kilometres, and their regions of operation, are depicted in Table 2.8.

In addition to the 54 intercity carriers shown in Table 2.7 (whose primary source of revenue is scheduled, intercity service), there are some 140 passenger bus operators whose major source of revenue is not scheduled service, but "other" services. Included within this category are commercial, airport, suburban, and charter/tour bus operators. Unfortunately, the data cannot be disaggregated in any meaningful fashion and, therefore, it is not possible to determine the size of the charter/tour operators, the type of service provided (local vs long-distance charter and tour), or a breakdown of the equipment (highway, urban, or school bus). All that can be gleaned from the data base is that total revenues of $97.5 million were generated in 1980 by "other passenger bus" operators (excluding school bus operators), of which $47.5 million were accounted for by charter and tour operations.

TABLE 2.8: CANADIAN CLASS I AND II INTERCITY BUS CARRIERS, 1978

PROVINCE/CARRIER	TOTAL ROUTE Km	CARRIER ROUTE Km	% of PROVINCIAL TOTAL
British Columbia	9,561		
Greyhound Lines		5,991	63
Pacific Coach Lines		1,067	
ten others			
Alberta	9,464		
Greyhound Lines		9,266	98
two others			
Saskatchewan	9,126		
Greyhound Lines		1,978	22
Sask. Transport Co.		6,043	66
four others			
Manitoba	7,005		
Greyhound Lines		2,216	32
Grey Goose Lines and MMT		4,547	65
three others			
Ontario	15,361		
Greyhound Lines		3,989	26
Gray Coach		2,665	17
Voyageur Colonial		2,416	16
Ontario Northland		1,593	10
Grey Goose		996	7
Charterways		731	
Canada Coach		700	
Travelways		681	
United Trails		566	
Chatham Coach Lines		93	
six others			
Quebec	6,716		
Greyhound Lines		282	4
Voyageur Colonial		430	6
Voyageur Inc.		5,877	88
Pontiac Bus Lines		127	2
New Brunswick-P.E.I.	1,479		
SMT (Eastern)		1,479	100
Nova Scotia	1,730		
Acadian Lines		1,218	70
Mackenzie Bus Lines		512	30
Newfoundland	904		
C.N. Road Cruiser		904	100

Source: Alberta Motor Transport Board (AMTB), Decision Upon an Application by Diversified Transportation Ltd., 1978, Exhibit 86.

Note: Only intercity bus lines with routes listed in the Official Canadian Bus Guide are included in this table. Some of the smaller Class II Quebec lines are not listed.

In order to obtain another perspective of the composition of the intercity bus industry, a tabulation and analysis of carrier information, provided in Bus Ride's 1982/83 Bus Industry Directory was conducted. The directory describes the types of services performed by each carrier and gives the number of vehicles in each fleet. From these data, a frequency distribution of carriers by region, type of operation, and size of fleet was calculated, thereby circumventing the revenue classification used by statistics Canada. Table 2.9 summarizes the data for Canada (similar data for the U.S. intercity market will be discussed later).

Although the Bus Ride Directory contains the vast majority of operators, comparison of this frequency distribution data with corresponding Statistics Canada data should be treated with caution. Nonetheless, these data are useful for descriptive purposes, and identify some interesting features of the Canadian intercity bus market. The following highlights may be noted:

- 80 (65.6%) of the 122 intercity operators entered are categorized as "composite" carriers. This means that in addition to scheduled/regular intercity service, they provide one or more of the other services (charter/tour, suburban, or "other", such as airport limousine, etc.). By implication, this means that buses operated in composite fleets may be assigned to different services; i.e., they must have use flexibility.

- the 23 composite carriers (only 19% of entries) with fleets in excess of 30 buses account for a total of 2093 vehicles, or 70% of the intercity total bus fleet.

- for all carriers reported, the average fleet size is 24.5 vehicles. However, the composite carriers have average fleets of 31.5 buses, whereas charter/tour operators average 6.6 buses. Closer scrutiny shows that the vast bulk of the composite service fleet is concentrated in the high end of the scale (few operators, but large fleets), whereas there are 32 charter/tour operators with an average of only 3.3 buses.

TABLE 2.9: CANADIAN INTERCITY CARRIER SERVICE TYPE AND FLEET SIZE DISTRIBUTION

SERVICE TYPE		FLEET SIZE (# OF VEHICLES) 0 - 9	10 - 29	30 - 59	60 - 99	100 - 499	TOTAL
Composite	- # of carriers	40	17	12	4	7	80
	- # of buses	159	265	451	270	1372	2517
	- average # buses	4.0	15.6	37.6	67.5	196.0	31.5
Intercity Regular	- # of carriers	1	-	-	-	-	1
	- # of buses	1	-	-	-	-	1
	- average # buses	1.0	-	-	-	-	1.0
Charter/ Tour	- # of carriers	32	5	1	-	-	38
	- # of buses	104	93	55	-	-	252
	- average # buses	3.3	18.6	55.0	-	-	6.6
Suburban	- # of carriers	-	-	-	-	1	1
	- # of buses	-	-	-	-	122	122
	- average # buses	-	-	-	-	122.0	122.0
Other	- # of carriers	-	1	-	1	-	2
	- # of buses	-	28	-	70	-	98
	- average # buses	-	28.0	-	70.0	-	49.0
Total	- # of carriers	73	23	13	5	8	122
	- # of buses	264	386	506	340	1494	2990
	- average # buses	3.6	16.8	38.9	68.0	186.8	24.5

Source: Tabulation of directory information provided in Bus Ride.

2.2.2 U.S. Carriers

In the U.S. intercity bus market, there is a far greater number of carriers and also less concern for confidentiality when it comes to presentation of operating data. Rather than aggregating statistics for Class I and II carriers as is done in Canada, Class I carriers alone are customarily given as representative of the American intercity bus market. Class I carriers are defined as those which generate gross revenues of $3,000,000 or more and who provide interstate service. There are 46 such Class I carriers which together, constitute only 3.5% of all intercity bus companies in the U.S. but account for 71.6% of total intercity revenue.

TABLE 2.10: U.S. INTERCITY BUS INDUSTRY SUMMARY (1980)

CHARACTERISTIC	TOTAL	CLASS I	CLASS I as % OF TOTAL
Passengers (millions)	373	134.2	36.0
Passenger kilometres (millions)	44,600	27,800	62.3
Operating Companies	1,330	46	3.5
Employees	49,600	31,190	62.9
No. of Buses	21,900	8,400	38.4
Operating Revenue (millions)	$1,947	$1,394	71.6
Pre-Tax Operating Income (millions)	$133.5	$81.1	60.7
Operating Margin	6.9	5.8	-

Source: American Bus Association, Bus Facts, 1981 Edition, p.1.

All other non-Class I U.S. intercity carriers have annual revenues of less than $3,000,000, or operate exclusively in intrastate service (whether scheduled, charter/tour/special, etc). Class I carriers account for the vast majority of U.S. scheduled (regular route) service (approx. 90%), whereas the smaller carriers tend to be concentrated in charter/tour/ special operations, providing some 67% of this travel in the U.S.[2]

Two national bus systems dominate the Class I carriers and, therefore, the American intercity bus industry. These are Greyhound Lines, Inc. and Trailways, Inc.

Expressed as a percentage of Class I carriers, in 1980 Greyhound owned 53.6% of the buses, operated 56.2% of the revenue bus-kilometres, carried 47.6% of revenue passengers, and subsequently generated 59.0% of Class I operating revenues.[3] Similarly, Greyhound's revenues represented an impressive 42% (approx.) of total industry revenue, all carriers.

Trailways is the second largest intercity carrier. In 1980, Trailways, Inc. and 17 subsidiary Class I carriers generated $306 million revenue; this represented approximately 22% of total Class I carrier revenues. The National Trailways Bus System, comprised of 72 subsidiary and independent, affiliated carriers, had 1980 revenues totalling approximately $435 million. This represented 22.3% of industry revenues, and roughly 53% of Greyhound's revenues for the same year.[4]

A similar pattern of concentration is displayed by the information extracted from Bus Ride's Industry Directory (see Table 2.11). However, recognizing the geographical area to be covered, and the fact that the U.S. intercity bus industry serves some 14,600 communities on regular route service, we should not be surprised by the large number of smaller carriers. As with the tabulation of the same data for Canada, what is pertinent to this study is the size of bus fleets. Of the total of 870 U.S. carriers, 440 (50.6%) have fleets averaging only 4.4 buses; 729 (83.8%) have fleet sizes of less than 30 buses, and averaging only 9.2 buses. The significance of fleet size in relation to other considerations such as the used bus resale market and equipment flexibility will become more apparent when discussing the potential for high capacity buses.

The U.S. intercity bus system has been subject to and fashioned by route and fare regulation of interstate operations by the federal government, and to route regulation on intrastate operations by state agencies. Similarly, while Greyhound and Trailways may connect many of the same major U.S. centres, they normally follow different routes; direct competition is not encouraged. The environment will change somewhat with the measures introduced by the recently passed Bus Regulatory Reform Act of 1982. In brief, this Act deregulates the industry, and allows entry of new operators in both scheduled and charter/tour services conditional only upon proof of being "safe, willing and able" to carry out the business for which they apply.

TABLE 2.11: U.S. INTERCITY CARRIER SERVICE TYPE AND FLEET SIZE DISTRIBUTION

		FLEET SIZE (# OF VEHICLES)						
SERVICE TYPE		0 - 9	10 - 29	30 - 59	60 - 99	100 - 499	500+	TOTAL
Composite	- # of carriers	168	170	69	17	12	4	440
	- # of buses	792	2857	2811	1348	1606	7212	16,622
	- average # buses	4.7	16.8	40.7	79.3	133.8	1803.0	37.8
Intercity Regular	- # of carriers	16	1	1	1	1	-	20
	- # of buses	60	10	47	66	135	-	318
	- average # buses	3.8	10.0	47.0	66.0	135.0	-	15.9
Charter/ Tour	- # of carriers	250	111	26	3	3	-	393
	- # of buses	1064	1784	959	223	310	-	4348
	- average # buses	4.2	16.1	36.9	74.3	106.0	-	19.5
Suburban	- # of carriers	1	2	1	-	-	-	4
	- # of buses	8	40	30	-	-	-	78
	- average # buses	8.0	20.0	30.0	-	-	-	19.5
Other	- # of carriers	5	5	1	-	2	-	13
	- # of buses	32	84	33	-	478	-	627
	- average # buses	6.4	16.8	33.0	-	239.0	-	48.2
Total	- # of carriers	440	289	98	21	8	4	870
	- # of buses	1956	4771	3880	1637	1494	7212	21,993
	- average # buses	4.4	16.5	39.6	78.0	186.8	1803.0	25.3

2.3 INTERCITY BUS MANUFACTURERS

The manufacture of intercity buses in North America is almost exclusively in the hands of three companies. Using their respective coach names, these are MCI, Eagle, and Prevost. There is a fourth manufacturer, Neoplan USA, which also imports highway coaches for intercity service. Neoplan will be discussed further in the section dealing with higher capacity configurations currently available on the market.

MCI is North America's largest intercity bus manufacturer, and is a subsidiary of the largest carrier, Greyhound Lines, Inc. MCI coaches are produced at three locations:

- Transportation Manufacturing Corporation (TMC)'s plant in Rosswell, New Mexico, and
- jointly at the two Motor Coach Industries (MCI) plants across the border from each other in Pembina, North Dakota and Winnipeg, Manitoba.

It is this latter arrangement which allows MCI to circumvent the Canadian import tariff and, therefore, penetrate the Canadian intercity coach market dutyfree.

The second largest intercity bus manufacturer, Eagle, is a subsidiary of New Trails Inc., the parent company of the second largest carrier, Trailways. Eagle buses are produced by Eagle International in Brownsville, Texas, and by Trailways Manufacturing Inc. at their new plant in Harligen, Texas.

Up to now, Eagle sales in the Canadian market have been miniscule because a Canadian buyer must pay the full import duty, to which MCI is not subject because of its Winnipeg-based production content. However, Eagle has recently entered into an arrangement with Ontario Bus Industries (OBI) of Mississauga, Ontario, whereby OBI will sell Eagle coaches in Canada and Eagle will market the Orion, OBI's urban transit coach, in the U.S. Although the exact details are not known, this arrangement will apparently circumvent the previous import duty hurdle for both firms in a reciprocal fashion, i.e., Eagle coaches sold in Canada are duty free to a value corresponding to the sales of Orion buses in the U.S.

The third manufacturer is Prevost Car Inc., which is located in Ste. Claire, Quebec. Unlike MCI and Eagle, Prevost is not affiliated with any carrier and, therefore, does not benefit from the captive market enjoyed by MCI, and to a lesser extent, Eagle. Although Prevost's production is the smallest of the three, its coaches have grown steadily in popularity, especially among tour operators. Prevost opened a new plant in 1981, more than doubling its production capacity.

All three manufacturers, in fact, have expanded their production capacities, with the result that they are capable of producing a total of approximately 3,950 intercity coaches per year. Table 2.12 breaks this capacity down according to manufacturer.

TABLE 2.12: NORTH AMERICAN INTERCITY BUS MANUFACTURING CAPACITY, 1982

MANUFACTURER	EST. UNITS PER DAY	EST. UNITS PER WEEK		ANNUAL PRODUCTION
MCI	11	-	x 240	2,640
Eagle	4	-	x 240	960
Prevost	-	7	x 50	350
TOTAL	-	-		3,950

Note: Includes expanded plant facilities for all three manufacturers. Excludes suburban coach production.

Source: Conversations with representatives of Hausman Bus Sales (MCI), American Coach Sales (Eagle) and Prevost.

In contrast to production capacity, Table 2.13 shows the actual production of intercity buses for the three manufacturers in 1981, and the American Bus Association's estimate of total annual production for the years 1977-1981. The 1981 figures by manufacturer are, as near as can be determined, equivalent to actual sales, i.e, vehicles delivered to purchaser.

TABLE 2.13: NORTH AMERICAN INTERCITY BUS PRODUCTION

	APPROXIMATE PRODUCTION*	ABA ESTIMATES				
MANUFACTURER	1981	1977	1978	1979	1980	1981
MCI	1,600					
Eagle	450					
Prevost	194					
TOTALS	2,244	1,420	1,500	1,600	1,800	2,200

Source: Conversations with representatives of Hausman Bus Sales (MCI), American Coach Sales (Eagle) and Prevost; and American Bus Association, Bus Facts, 1982 Edition.

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* The 450 Eagle coaches were consumed almost solely by the U.S. market. Approximately 200 MCI coaches were sold in Canada.[5] Prevost's production of 194 was made up of 56 sold in Canada and 138 in the U.S.[6]

3.0 INDUSTRY SURVEY

A review of available literature and data goes only so far in providing a comprehensive picture of where the North American intercity bus market is going, and whether there are potential markets for higher capacity buses. Direct contact is required with those involved in the industry in order to fill out the picture. More specifically, additional understanding of whatever trends exist in the various intercity services is needed, along with an appreciation of the carriers' needs and wants with respect to bus capacity and configuration.

In this section, we will discuss the interviews conducted with intercity carriers and other involved parties, the methodology used, and the findings. Rather than discuss the survey findings in isolation, we will intersperse relevant material obtained from other sources throughout the chapter.

3.1 SURVEY METHODOLOGY

Initially, it was proposed that a survey of carriers would be for the purpose of determining their needs and wants with respect to intercity bus capacity and configuration. As has already been indicated, it became apparent that such a survey of purchasers and users also provided an opportunity to obtain additional input vis à vis present methods of operation, market trends, and other areas of interest.

The choice of how best to survey the industry was not a difficult one. The amount of information sought (both general and specific) and the fact that, in many cases, multi-service (composite) carriers would be questioned, resulted in a sizable questionnaire "package". This alone precluded the use of a telephone survey approach. A mail questionnaire was likewise discounted, again partly because of the length, combined with the senior level of respondents we wished to reach and, therefore, a suspected low return rate. This left personal, face-to-face interviews as the only viable alternative, as these allowed for adequate time to cover the many areas of interest and permitted probing into specific topics as and when necessary.

Rather than attempt to conduct these interviews at the respondent's place of operation, which would result in costly and time-consuming travel to dispersed locations, major study economies were realized by carrying out the survey in conjunction with the American Bus Association's (ABA) annual convention in early October, 1982. Prior to the convention, the questionnnaire package was pre-tested by telephone with several carriers. Similarly, telephone contact was made with a number of those whom we wished to interview in order to first determine whether they planned to attend, and then to obtain their agreement to participate in the interview.

3.1.1 Questionnaire Description

The questionnaire package consisted of six basic sections which were administered in part or in total, depending upon the respondent's scope of involvement in the intercity bus market. (Copies attached in Appendix A) In summary, these sections were:

> **Section A - General:** Designed to identify the services performed by the respondent and to gather general information regarding size and composition of the fleet, vehicle purchase and disposition, methods of determining effective utilization of buses, and cost of operations.
>
> **Section B - Tour Services:** For respondents providing tour services, specific questions were aimed at determining the nature of their tour operations, seasonality, differences in buses operated in tour vs other services, opinions regarding past and future trends in this market segment, load factors and group sizes, and other relevant data.
>
> **Section C - Charter Services:** Similar to Section B (Tour Services), but geared to carriers operating a charter service as opposed to running tour packages (i.e., chartering out a bus or buses to one customer, rather than filling a bus with tour passengers).

Section D - Scheduled/Regular Service: Aimed at the specifics of regular route service, with particular interest in whether the respondent had high capacity routes necessitating use of extra sections (2 or more buses for a scheduled departure).

Section E - High Capacity Buses: The approach taken in this section was to first query the respondent as to whether he saw a need for a high capacity bus within his operations or within the industry at large, now or in the future. The assumptions stated were that (1) the cost of operating an alternative configuration would be comparable to the cost of a conventional coach when expressed in cents per passenger kilometre and at a specified passenger loading; (2) that acceptable design standards would be met; and (3) that no regulatory restrictions would exist. The intent, therefore, was to first obtain the respondent's impressions, primarily in terms of his capacity (passenger loading) requirements, and conversely, not to have him overly preoccupied with economic, design or regulatory concerns.

The respondent was then questioned as to what he liked or disliked about the alternative design configurations available in North America, and what restrictions he believed might hinder the introduction of high capacity buses (e.g., regulatory, driver and passenger reaction, carrier's facilities such as garages, maintenance bays, etc., and "downstream" considerations such as restaurants, hotels, etc.).

Section F - Discussion Outlines: Although the ABA convention allowed face-to-face contact with carriers, circumstances did not always permit a long, uninterrupted session. And in several instances, respondents were caught for short interviews between meetings and other commitments. Furthermore, the individuals in question were for the most part senior executives, if not owners of their firms. As many of the questions in Sections A-D are detailed, it was to be expected that these respondents would not necessarily have specific operating data at hand.

Consequently, where it seemed advisable, a more loosely structured discussion outline was used in lieu of the questionnaires described above. This tackled essentially the same subject areas, but in an open-ended fashion. It was also better suited for interviews with non-operators such as, for instance, bus distributors, or leasing firms.

3.1.2 Sample Size

In total, 18 interviews were carried out, the majority of which were with intercity bus operators. A list of the individuals surveyed is provided in Appendix B. Not included in this list are the numerous industry people with whom discussions were held, either in the course of pre-testing the questionnaires or tracking down specific information.

A word or two may be in order regarding the sample size. With the multiple objectives of forecasting the intercity bus market to 1990 determining whether or not markets do -- or will -- exist for high capacity buses, identifying which alternative bus configuration would be preferred, and sizing the demand for this bus, a survey methodology which produces quantifiable data would obviously be desirable. For a number of reasons, however, a sample sufficiently large to provide data of statistical confidence was not feasible under the circumstances. However, it is believed that the nature of the survey respondents, and the nature and quality of findings, is acceptable for the purposes of this study.

As stated earlier, interviews conducted at the ABA convention, supplemented by other phone contacts and interviews, allowed for a minimization of cost and time expenditure. To have attempted a much larger and more quantiative sample (say, 50 or more) was beyond the scope of the current study.

3.2 SURVEY FINDINGS

3.2.1 Trends Within The Market

A discussion of trends within the intercity bus market revolves around considerations of industry regulation, passenger profile, alternative modes of intercity travel, market structure and mix, and the economy. No one factor, by itself, dictates what has happened or will happen to the industry. However, the views and opinions of those surveyed do provide valuable insight and input when projecting a "best estimate" of what is likely to occur in the next 5-10 years.

Regulation in its many forms has shaped the intercity bus market in both Canada and the U.S. At the moment, what is of particular importance in the U.S. is the Bus Regulatory Reform Act of 1982, signed into law by President Reagan on September 20, 1982 and effective November 19, 1982. As a result of this Act, the industry moves into a more competitive environment in which federal and state regulations are significantly eased. The new Act makes obsolete over 90% of what was previously written on the economic regulation of the bus industry. (A manual which was jointly prepared by the American Bus Association and the National Bus Traffic Association, and was presented at a joint session of ABA's and NBTA's conventions, October 5, 1982, contained 150 pages describing the changes.)[7]

The essence of the Act is that entry is now made comparatively easy to both regular route and charter/tour operators. At the risk of oversimplification, the Act states that an applicant may obtain operating authority provided he can demonstrate that he is "fit, willing, and able to provide the transportation to be authorized". "Fit, willing, and able" are to be defined as roadworthiness and proof of minimum financial responsibility.[8] The intent of the changes is to facilitate entry by new companies and expansion by existing operators.

Another aspect changed is exit, or discontinuance of scheduled service. If a request for discontinuance of a particular route is disputed, the onus still falls on the carrier to prove that continuance of that service would be an unreasonable burden and cost. However, notwithstanding this, approval by the Interstate Commerce Commission will be easier to obtain. Comparative ease of exit will, naturally, lessen the drain on resources faced by firms previously obliged to continue operation of certain routes at a heavy loss.

Start-up of new firms, it is suggested, will occur more in the area of charter/tour services than scheduled service. This projection is based on two basic considerations. The charter/tour market, as outlined in the previous chapter, is the market segment which has experienced, and is expected to continue experiencing, growth. For this reason, it is likely to be perceived by an applicant as being the service in which a profit may be made. Conversely, scheduled service requires, among other things, two ingredients that a small operator (typical of the charter/tour business) would not want to provide, namely:

1) frequency and scope of scheduled service, thereby requiring a larger fleet and capital outlay; and

2) the increased overheads (terminals, etc.) prerequisite to running a scheduled service.

Thus, the charter/tour market's attraction rests in the ease of entry, market growth record and potential, minimal capital outlay, and profit. (The deregulation by state authorities of Florida's intercity bus market, and the ensuing influx of tour operators, was a case study in deregulation effects.)

By the same token, the larger, composite carriers surveyed (whose mainstay is scheduled service) were, in many instances, of the opinion that they would leave the provision of charter/tour services to the smaller operators. This opinion appeared to be based, as in the case of Michaud Trailways, upon a desire to optimize their scheduled service, and likewise, as stated by Steve Griffith, Executive Vice-President of Trailways Inc., to minimize involvement in a market populated by many entrepreneurs.

Turning to the question of exit: in the next year, we should see the U.S. scheduled carriers pulling out of certain unprofitable routes. Trailways Inc. estimates that within its affiliated system the maximum number of routes which may be culled over time would equate to a reduction of bus kilometres by 5% and revenue passengers by 3% (the corresponding improvement in profit, however, was not estimated). Even if we assume similar action by Greyhound and the balance of intercity scheduled service carriers, the maximum effect on bus kilometres and revenue passengers would be marginal.

Of more interest to this study is the effect exit would have on buses operated throughout the system. It may be assumed that the elimination of unprofitable routes would allow scheduled carriers to divest themselves of what would now be surplus equipment. However, insofar as the routes in question are unprofitable, low density routes, to an extent it may be assumed that older equipment is customarily assigned to these routes; therefore, it is older, surplus equipment that would be retired.

On the other hand, the void subsequently left by scheduled carriers discontinuing service on these routes may have to be filled in some fashion. The passengers previously carried, it is argued, would still travel -- not necessarily by another mode -- but with a smaller, local bus operator who would enter the market. His overhead would be small and his buses most probably used to minimize capital investment. The net effect of this exit and entry scenario upon the total number of intercity buses operated will, thus, be insignificant.

An increase in the number of intercity highway coaches may result, however, from the entry of new charter/tour operators following upon the heels of regulatory reform. This thesis is also debatable if it is assumed that the large, composite carriers will reduce their activity in this same market in favour of concentrating upon scheduled intercity service and the more profitable parcel express service. Once again, the net effect may amount to simply a "change of ownership" of buses from one class of operator to another.

What, therefore, will be the overall impact of regulatory reform upon the number of buses in operation and, more importantly, upon the purchase of new buses? Without any means of accurately quantifying the additions and deletions to total fleets resulting from the effects of deregulation described, this is difficult to project with any degree of certainty. To a large extent, they may well discount each other, and in the final analysis produce a marginally increased demand for buses due to the continued growth of the charter/tour market (assuming a no-growth situation in scheduled service). Even this charter/tour demand must be tempered by the realization that buses in those services are customarily under-utilized and there is, therefore, some degree of existing system capacity to absorb future growth.

Another area to take into consideration when reviewing trends in the intercity bus market is consumer preference and behaviour. The carriers, needless to say, recognize the historical and persistent image of intercity bus travel held by the travelling public. Efforts have been made to somewhat change this by upgrading terminal facilities, offering premium intercity service catering to the higher income business traveller, and by other means. Results to date would not appear encouraging.

The oil crisis of the mid-seventies caused a momentary surge in passenger volume, but this was short-lived. The development of more fuel efficient cars, combined with the preference of the typical North American to travel by private automobile, whether for pleasure or business, has not helped the scheduled intercity service market.

Where carriers do detect a change in passenger preferences and buying behaviour is in the charter/tour market. Customers, they feel, are becoming more discriminating and demanding in terms of what they receive for their money, i.e., the comfort and outfitting of the buses used in charter/tour service.

This may have ramifications in terms of the market demand for new buses. Given an increase in the charter/tour market and an increase in the number of operators within that service, an increase in the number of buses run may be argued for. Given also the demand by charter/tour operators for quality, first-line equipment, it could be argued that this demand for additonal coaches will be filled more by new bus sales than by sales of used equipment.

3.2.2 Loading and Extra Sections

When interviewing carriers, we also wished to determine the levels of passenger loading they experience. Specifically, we wished to see with what frequency extra sections are required on scheduled intercity departures. We also wished to determine, if possible, the customary size of charter and tour groups and, therefore, the frequency of extra sections in that service as well.

Scheduled, intercity service will be analyzed here. An interesting statistic for the U.S. market is the passenger loads for buses operated in scheduled service by Class 1 carriers. In 1980, the average number of passengers per bus was 19.9 passengers, down from the 1979 figure of 20.4, and not noticeably better than any year during the previous decade (again, the 1974 oil crisis witnessed a minor upsurge to 20.2 passengers per bus). As stated in ABA's 1981 edition of Bus Facts:

> "With average loads...continuing relatively unchanged at 44 to 47 percent of average bus seating capacity, it has been only the increase in average fares, greater package express receipts and, for many carriers, rising volume of charter and tour services which kept gross revenues from falling behind expenses on a broad scale."[9]

Canadian intercity carriers are not required by Statistics Canada to report passenger-kilometre data and, therefore, an identification of a system- wide load factor is not possible. However, we do know that total Class I and II passenger volume has remained relatively stable over recent years (refer to Table 2.4). On the other hand, the total distance run by Class I and II carriers has increased from 183 million kilometres in 1976 to 200 million kilometres in 1980. A comparison of these trends in passenger volume and distance run would appear to indicate, in gross terms at least, a reduced system utilization.

Another indication of load factors experienced in Canadian intercity operations may be derived from Reschenthaler's analysis of trip load statistics for 50 of Greyhound Alberta's routes. The mean average load was calculated as 17.4 passengers per trip, or a load factor of 40.5% if a vehicle seating capacity of 43 seats is assumed.[10] A previous study of high capacity buses involved the analysis of route data for Voyageur's operations. Based upon the data available in that report, an average load of 18.7 passengers per trip was estimated for 1978; this is equivalent to a load factor of 43.5%.[11]

Load factors such as these, however, provide only an overview of system capacity utilization. Conversely, they do not specify on which routes, and with what frequency, extra sections are required. Short of executing a detailed analysis of route data for a sufficiently large and representative number of carriers, we have no means of determining precise answers to these questions throughout the total system.

The interviews, however, did reveal that the consistently high load factors experienced on certain Voyageur routes (and which subsequently supported the testing of an articulated intercity coach) would definitely appear to be the exception rather than the rule among North American intercity carriers operating in scheduled services. This is not to say that other high volume routes do not exist. However, our survey findings would indicate that they are small in number, and are likely to be characterized by both seasonal fluctuations and peak loadings at certain times of the week. The end result, therefore, is an inconsistent requirement over time for extra sections.

When confronted with fluctuating requirements for extra sections such as this, carriers have the option of increasing the frequency of scheduled departures rather than simply adding extra sections to already established departure times. Not surprisingly, this operational strategy works best when the peaks in demand occur with regularity and have a set pattern (i.e., certain days of the week and certain times of the day). An excellent example of this was encountered when interviewing Bonanza Bus Lines of Providence, Rhode Island, and is further described in research carried out by Charles River Associates.[12]

Briefly, part of Bonanza's operations consists of an hourly, well-patronized service between Providence, Rhode Island and Boston's Logan Airport. The consumer research conducted by the CRA consultants determined that passengers would perceive an increase in frequency (i.e., a greater number of scheduled departures) to be a significant improvement in service. More importantly, it was determined that passengers would be willing to pay a premium fare for this improved service and that total passenger volumes (and therefore revenues) would increase as a result. These findings supported Bonanza's decision to increase the frequency of scheduled departures at peak times.

A model built by A. T. Kearney in order to estimate fare elasticity for intercity bus demand similarly argues the relationship between passenger volumes and frequency (i.e., service). This model indicated that passenger volumes increase by 1% for a corresponding 1% increase in frequency.[13] During our interviews, other carriers expressed the same opinion regarding peak demand periods on scheduled intercity routes, namely, the preference for increasing scheduled departures as opposed to simply adding extra sections.

The charter/tour business is even more difficult to generalize about, in terms of passenger volumes and load factors. It goes without saying that the seasons have an overall effect upon the market demand for this service, essentially determining where and when tour packages run (e.g., winter ski packages, fall foliage tours, etc.)

Given that a particular tour is to run, a passenger load of 30 appears to be a commonly accepted break-even point. In other words, each passenger in excess of this is profit for the operator. How much profit will depend upon a number of variables, including the seating capacity of the bus, the cost of operations and, of course, the total passenger count. Furthermore, this rule of thumb break-even point may be higher or lower depending upon the price charged per passenger in comparison to the actual costs incurred for that tour.

The break-even point, however, merely establishes a minimum acceptable passenger loading. Whether or not an extra section is dispatched on a tour is a function, quite simply, of the total demand (i.e., number of passengers) for that package. It will also depend upon the tour operator's policy with respect to the minimum number of additional passengers (in excess of the capacity of the first bus) that he requires before a second vehicle will be dispatched. Just as there is infinite variety in the type and popularity of tours, and therefore of passenger loads within the tour market, there is also variety in the approaches taken by operators to the use of extra sections.

By way of example only (and not to be taken necessarily as representative of the tour industry in general), Michaud Trailways indicated that two buses are required on its tour operations 75% of the time. Michaud's own particular policy is to load 38 passengers per bus --- the company does not wish to have its customers "packed like sardines." Furthermore, its policy is that there must be a minimum of 20 additional passengers (therefore, an approximate total of 58) before a second section is dispatched.

Another example is American Sightseeing of Miami, which operates a variety of local tours that involve picking up the passengers at their hotels. The total tour group size will often necessitate two buses, although they will strive to remain flexible and will cancel the second section during the course of their pick-ups if, based on experience, they feel the expected total count will not justify the operating expense of two buses.

Again, the variety of operations found within the tour industry is to be emphasized. The duration of tour packages can range from local sightseeing of less than a day (such as those offered by American Sightseeing) to specialty tours of two or more weeks. An example of the latter is East Coast Parlour Tours' summer package running from Philadelphia up through Canada, to the Rockies and the West Coast, and down to California; the passenger may then elect to continue by bus on the remaining leg, or fly home. Just as the length may vary, so will the equipment. Local tours of short distance and duration may use a highway coach without toilet facilities in order to provide more seating; a longer distance tour coach will be more comfortably equipped. Some tour passengers are concerned with economy and will accept cramped onboard accommodation; others want to travel in more style, as exemplified by the casino runs to Las Vegas or Atlantic City.

3.2.3 Age, Utilization and Resale of Intercity Buses

To appreciate the market for new coach sales and, therefore, the potential for higher capacity buses, it is necessary to have some understanding of what happens to a bus from the time of first purchase in terms of:

- how long it is retained by its first operator;
- how its utilization varies in terms of age and service; and
- who the used coach is subsequently sold to.

The age of an intercity coach will, to a certain extent, determine the service in which it is used. The large composite carriers account not only for the bulk of intercity revenues, passengers, etc., but also for the bulk of new vehicle purchases. As a result, a new coach is likely to be placed first in scheduled, line-haul service, partially because it contributes to a desired, up-to-date service image, but also because of its low initial maintenance cost. After perhaps a year, the bus may be assigned to the carrier's tour operations, while still older coaches may be used for chartering purposes (when a top line coach is not required) or kept as spares for peak demand periods in scheduled, charter or tour services. The above, however, is at best a generalization, and circumstances will vary from operation to operation.

Likewise, the number of years a new coach is kept in service by its first owner will vary according to operator, and will perhaps be a function of several considerations. Included in these will be the type and size of the carrier's operations and, therefore, the capacity to reassign a bus to other services depending on equipment age, condition, and customer requirements. How long a carrier retains equipment will also be influenced by his opinions regarding financing of buses, tax credits to be realized, and the health of the resale market.

In its 1978 study of the intercity bus market, ICC reported that Greyhound's average vehicle age in 1976 was 6.6 years and that this was falling as operators attempted to modernize their fleets. The corresponding figure for Trailways was 7 years; the older average age reflected a drop in earnings at that time, and a greater proportion of used bus purchases.[14] Although in our survey we found one carrier who sells his highway coaches after only a year of operation, a more representative and current figure would appear to be in the neighbourhood of five years.

Utilization of highway coaches expressed in terms of distance run each year will, as already indicated, vary according to the service in which it is utilized. Charter/tour coaches may have annual distances as low as 80,000 kilometres, while 160,000 kilometres would be a very satisfactory utilization. On the other hand, scheduled service operations have higher operating costs and overheads and will strive for increased utilization; coaches in scheduled service, we found, may range anywhere from 130,000 kilometres to as much as 330,000.

We have already indicated that the larger scheduled service and charter/tour operations account for the bulk of new bus purchases. However, this does not preclude the purchase of used equipment by Class I (U.S. or Canadian) carriers. If, at certain times, a carrier is exhausting its fleet capacity, or simply wishes to expand but has capital limitations, then a well-priced, well-maintained used coach is a practical and economical addition to the fleet. Table 3.1 shows the bus purchases for 1972-76 for both Greyhound and Trailways. Whereas Greyhound purchased relatively few used buses for the period reported, Trailways purchased an increasingly larger proportion. The increased number of bus acquisitions in 1975 (new and used) may reflect a desire to expand capacity following upon the 1974 oil crisis. However, at the same time, and more so in 1976, carriers were contending with reduced earnings. The net effect was, as stated, a greater proportion of used, less costly equipment.

TABLE 3-1: U.S. NEW AND USED BUS ACQUISITIONS

YEAR	GREYHOUND		TRAILWAYS*	
	NEW	USED	NEW	USED
1972	381	-	277	8
1973	361	-	231	58
1974	248	-	197	63
1975	418	6	174	138
1976	435	45	58	50

* Trailways, Inc. and 14 Class I affiliates

Source: Interstate Commerce Commission, The Intercity Bus Industry: A Preliminary Study, May, 1978, p. 80.

Relatively speaking, most used buses are picked up by the smaller operators. As any given bus ages, its maintenance costs per kilometre become proportionally high for the annual distance or utilization required by the larger, scheduled operators. By the same token, its market value depreciates, and the vehicle becomes increasingly affordable to the smaller opeartor. In an industry where the cost of buses represents approximately 80% of capital outlay for the larger carriers (and a larger percentage still for the smaller carriers, which do not necessarily have the same terminals, overheads, etc.), it is this older, depreciated equipment in good repair which facilitates the entry to the market of new and smaller opeartors. Conversely, it is the larger carriers, with more capital and leverage at their disposal, which are the prime market for new buses.

4.0 COMPARATIVE COST ANALYSIS OF ALTERNATIVE BUSES

The purpose of this chapter is to develop cost profiles of apparent alternative bus systems. From an economic assessment point of view, these costs must be developed on two levels:

- on an incremental passenger demand level;
- on an integrated (over specific time period) basis.

The analytical approach which has been used in this study is similar to that used in a previous study undertaken on intercity buses. In that study, an incremental demand analysis technique was developed and that model was adapted for use in this study. A full description of this model is available in the previous report; however, it basically requires input by the user of:

- the seating capacity of the coach;
- an estimate of the bus cost per km (capital cost, maintenance cost, fuel cost, etc);
- driver cost per km; and
- overhead costs per km.

The model allows a baseline bus and an alternative bus to be compared on a differential cost and percentage cost difference basis as passenger volumes are added. In this way, continuous estimates of the cost per passenger km are created over a passenger demand volume which can be as large as a user requires.

This data can then be used to estimate an average savings on specific routes if the demand profile of that route is known. Naturally, this can be taken one step further, in a much more complex fashion, on a system-wide basis if required. In this study, no specific operator was used as the test case, but rather a composite picture of operators was developed and high and low ranges tested.

4.1 OPERATOR'S COST PROFILE

Based on the extensive interviewing that took place during this study, the operators of highway coach equipment were divided into two broad categories:

- o large operators having in excess of 100 coaches and unionized employees; and
- o small operators having less than 100 coaches and non-unionized shops.

Based on the data obtained from the operators, equipment suppliers, and regulatory boards such as ICC and CTC, cost profiles of these operations were developed which provided ranges of applicable costs in each one of the categories required for the costing model. The results of this cost profile are presented in Table 4.1.

It is noteworthy that the difference in cost structure between the large and small operators is not that great. The principal differences occur in the vehicle utilization rate, which is higher for the large operator, and the labour costs, which are lower for the small operator. No assessment of the overhead costs of the individual companies are included as these are highly variable due to the administrative structure of the company and are not clearly related to the type of equipment which it runs.

TABLE 4.1: OPERATORS' COST PROFILES

COST ITEM	OPERATOR SIZE LARGE	OPERATOR SIZE SMALL
No. of Coaches	100	100
New Coach Cost ($000)	180-200	180-200
Financing Costs	12-16%	12-16%
Vehicle Utilization ($000km/yr)	160-240	96-160
Labour Cost ($/km)	0.50-0.60	0.24-0.36
Fuel Cost ($/L)	0.31-0.44	0.31-0.44
Fuel Consumption (L/km)	43-36	43-36
Maintenance Cost ($/km)	0.15-0.20	0.15-0.20

TABLE 4.2: ALTERNATIVE BUS COSTS

ITEM	RANGE OF TEST
Seat Capacity	61 - 72
Capital Cost	$250,000 - $350,000
Labour Cost	same as baseline
Finance Cost	same as baseline
Fuel Cost	same as baseline
Fuel Consumption	12% more than baseline
Maintenance Cost	25% more than baseline

Based on these cost structures, it can be seen (Figure 4.1) that these small operators (without overhead cost factored in) can offer substantially cheaper services than the large operator. The small operator's costs, according to this profile, range from $1.05/km to $0.64/km. The large operators, on the other hand, have cost structures which range from $1.19/km to $0.85/km.

It is important to notice that the labour cost is a very significant portion of the total operating cost of coaches in either size of operation, as labour costs range between 50 and 60% of the direct cost of operating any coach on a highway. It is for this reason that higher capacity coaches may be effective in some operations, reducing costs by eliminating driver costs and reducing the total number of bus units in the fleet inventory. This last point, of course, is offset by the fact that the larger buses will have the same or higher capital cost per seat as conventional coaches.

4.2 INCREMENTAL COST ANALYSIS

Based on the cost profiles developed in the previous section, a number of cost scenarios were developed for processing by the cost estimating model. These scenarios attempted to express the best and worst cost situations which could occur within each operator group. In other words, the highest utilization with the lowest capital cost and driver cost would result in the low cost option within any operator group. Conversely, the operators with the lowest utilization of equipment and highest fixed cost structures would create the high cost option. Against each one of these baseline conditions, the alternative buses were compared.

Rather than try to develop explicit costs for the alternative buses, the study team took the ranges of probable cost structures and tested them against the baseline cost. In each case, it was assumed that only the first section bus would be changed to a larger capacity unit. This, from

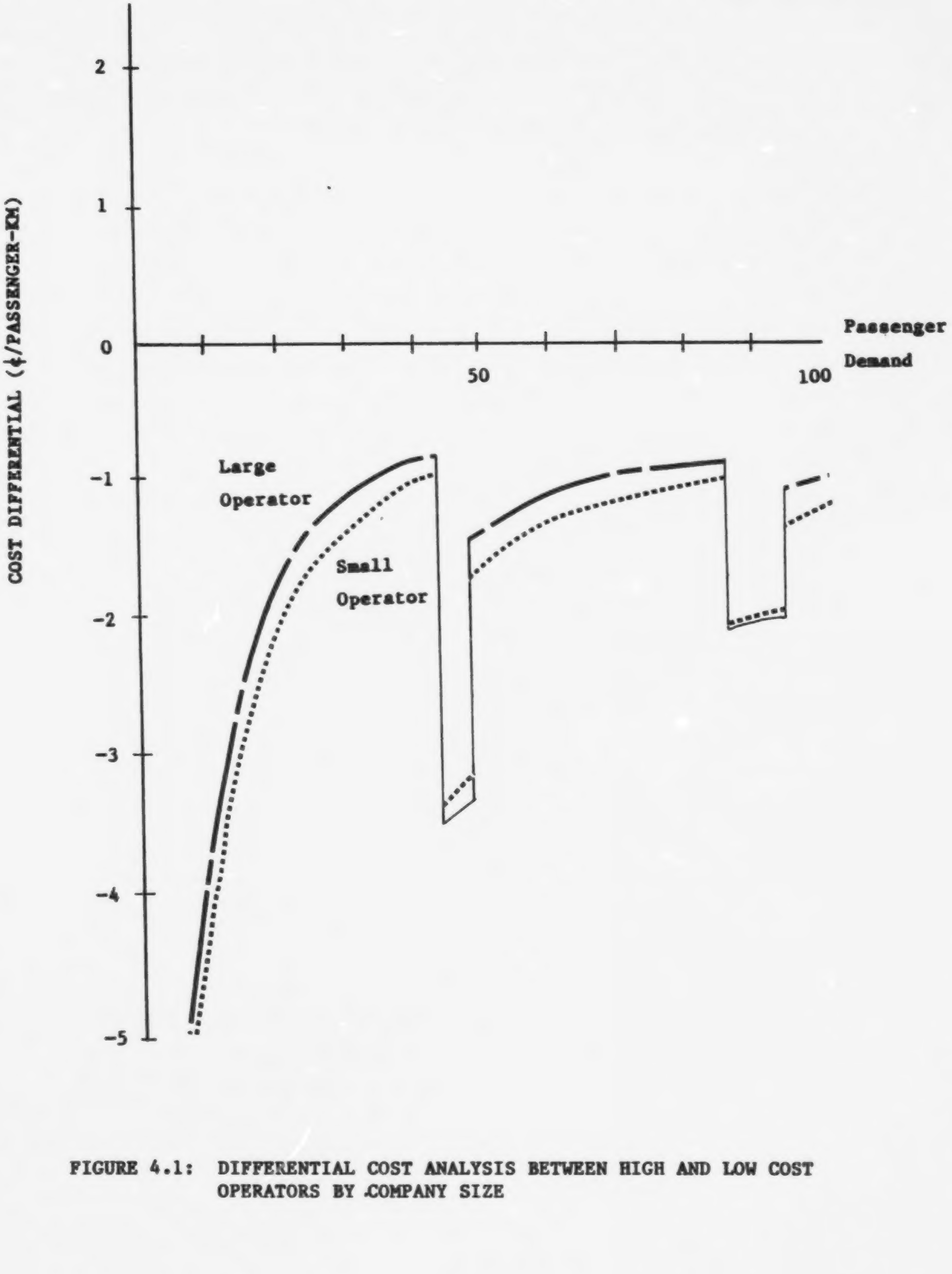


FIGURE 4.1: DIFFERENTIAL COST ANALYSIS BETWEEN HIGH AND LOW COST OPERATORS BY COMPANY SIZE

the market intelligence compiled from the industry interviews, is the most probable operational situation for any potential users. In Table 4.2, the ranges of these assumptions are presented.

Because the actual physical configuration of the bus, i.e., whether or not it is a double decker or an articulated version, makes no difference to the cost model, only the seat capacity, capital costs, fuel consumption and maintenance cost factors were changed from the baseline. The seat capacity range of 61 to 72 represents the current probable range of any potential bus alternate. The low 61 seat capacity would represent a relatively high level seat arrangement with maximum seat pitch while the 72 is a close-packed seating configuration. From the current suppliers and developers of higher capacity coaches, it was estimated that the expected cost ranges are $250,000 to $350,000. The fuel consumption is estimated to be 12% worse than the baseline, based primarily on the experience of Golden Nugget Lines (New Jersey), which has been running 12 NEOPLAN double deckers. The experience of Voyageur with their articulated bus, which has been documented in a previous TDC report 21, is considered to be a unique situation and one which created much higher fuel consumption penalties due to the initial specification of the vehicle. Finally, it is assumed that the maintenance cost of either the double decker or articulated versions would be in the order of 25% more than the conventional buses. This high maintenance penalty is used to represent the likely higher cost due to the uniqueness of the equipment and the increased complexity and number of seats on board each vehicle.

4.3 INCREMENTAL COST COMPARISON

Using the cost structures outline in the previous section, a number of model runs were completed for each of the operator types. These results are plotted in Figures 4.1 to 4.3. Complete printouts are in Appendix C.

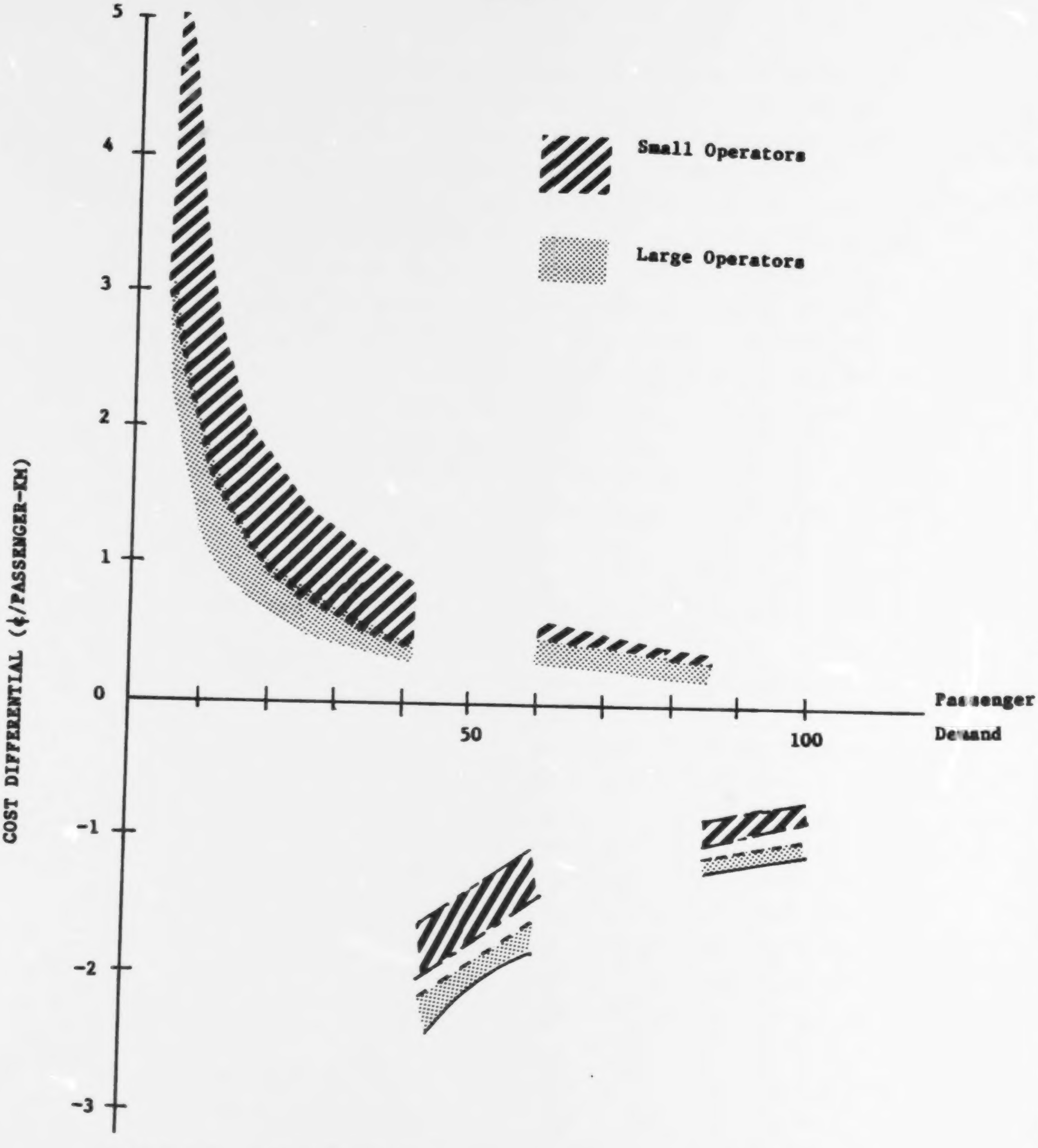


FIGURE 4.2: DIFFERENTIAL COST ANALYSIS FOR HIGH COST OPERATORS

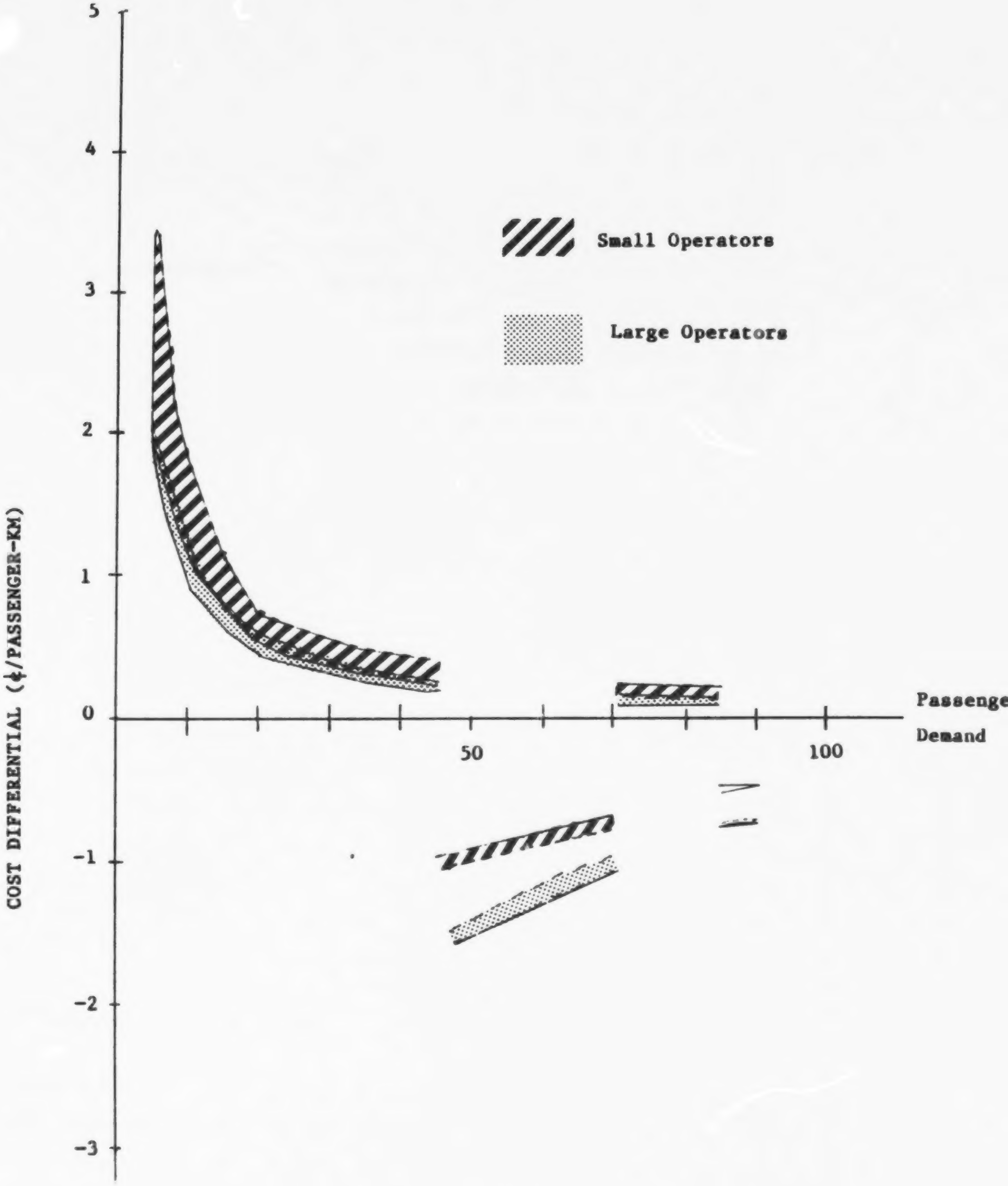


FIGURE 4.3: DIFFERENTIAL COST ANALYSIS FOR LOW COST OPERATORS

The first analysis was a comparison of the high and low cost ranges for each of the operator types using conventional coaches. This data is presented in Figure 4.1 and indicates that the cost differential between high and low end operators, whether or not they are small or large, is small throughout the higher passenger range. As the low cost operator is assumed to be using 47 seat units while the high cost operator is assumed to be using 43 seat units, the graph indicates that significant cost savings are achieved by the low cost operator in the marginal demand areas between 43 seats and 47 seats and, again, between 87 and 94 seats. It should be noted that the percentage difference beween the high and low cost cases for the 0-to-43 seat demand regime and, again, between 47 and 86, is 29%; while in the intervening demand areas, the cost savings jump to 64% between 43 and 47 passengers and 52% between 87 and 94 passengers. For the small operator, these percentage differences are 42%, 71% and 61% respectively.

The outputs representing the model runs for the alternative buses are presented in Figures 4.2 and 4.3. The analysis was divided into the low cost and the high cost assumptions for the small and large operators respectively. Further, the sensitivity of capital cost was tested to create a range of cost differences for each cost group. The high cost scenarios are presented in Figure 4.2 and indicate a cost penalty throughout the first secton of passenger demand with a significant cost savings in the next section, up to 61 seats. For the small operators, the cost penalty is higher and the cost saving somewhat smaller than for the large operators. The penalties at the 20-passenger demand level range from 6 cents per passenger km to 15 cents per passenger km for the $250,000 and $350,000 capital cost assumptions respectively. These costs stay relatively constant out to the end of the first section capacity.

The cost savings of the second section range from 14 cents per passenger mile to 24 cents per passenger mile for the low and high cost buses out to 61 passengers. After that, there is a zone of small cost penalty, which is once again followed by a cost saving. In percentage terms, these costs and savings amount to a 10% to 27% penalty in the first section, a 36% to 45% saving from 43 to 61 passengers, followed by a 5% to 14% penalty and, finally, a 24% to 30% saving.

The low cost operators, both large and small, are expected to have cost impacts as detailed in Figure 4.3 This graph is very similar to Figure 4.2, but indicates a much lower range of cost variance between the large and small operators and the high and low capital cost of equipment assumptions. Also, the overall cost penalty and, conversely, the savings are generally lower in this plot. For instance, the cost penalty at 20-passenger demand level is 4 to 9 cents per passenger km, which is at the low end of the previous costs of Figure 4.2. In the low cost assumption, the bus size for the baseline is assumed to be 47 seats and, therefore, the penalty continues out to 47 passengers, after which the savings start and continue out to 72 passengers (the assumed seating capacity of the larger bus). These savings are lower in dollar terms than the previous analysis, and indicate that small operators get substantially lower cost benefits from the larger buses than do the larger operators. This decrease in benefits is primarily due to the influence of driver wages in the costing model.

4.4 AGGREGATE DEMAND COST IMPACTS

The incremental demand analysis detailed above clearly indicates that there are significant cost savings to be achieved at certain specific passenger demand levels. Conversely, there are equally significant penalties to be incurred, especially at the low end of passenger demands. It is, thus, very important to understand the nature of the bus passenger demand profile so that the true impact of alternative methods of servicing that demand can be properly assessed.

In the discussions which the study team had with various operators throughout North America, it was clear that, with a very few exceptions, the operators would opt to increase the frequency of buses in preference to increasing the size of buses. This was primarily due to the general concensus that frequency gave them some market advantage over their

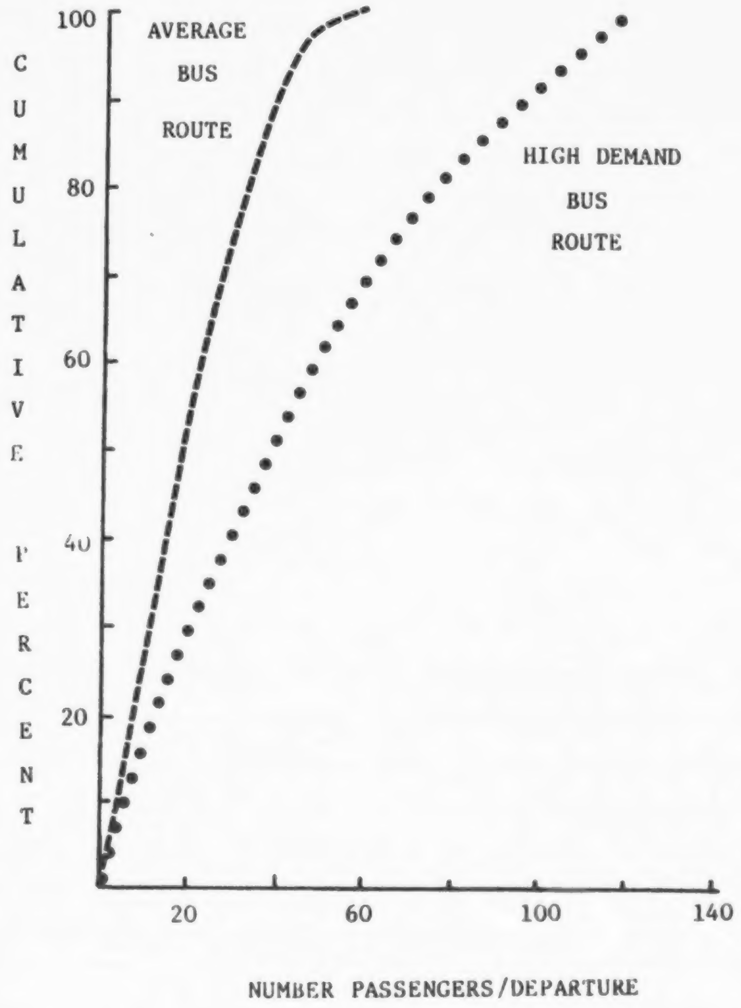
TABLE 4.3: AGGREGATE DEMAND COST ANALYSIS

LEVEL OF DEMAND	LARGE OPERATORS		SMALL OPERATORS	
	HIGH END*	LOW END	HIGH END	LOW END
HIGH	3 to -3**	-1 to -4	10 to -1	9 to 0
LOW	15 to 7	11 to 8	24 to 45	23 to 12

* Range of operator costs using conventional coaches data based on output in Appendix C.

**Percent change from conventional coaches - range is determined by variation in HCB unit costs.

FIGURE 4.4: CUMULATIVE PASSENGER DEMAND DISTRIBUTIONS



competitors both within and outside the mode. Also, the average system-wide passenger load factor, as documented in ICC and Statistics Canada data, has been ranging from 19 to 20 passengers per bus for the last decade. It is important also to note that, while this is the per bus passenger loading, it is not the departure loading. It is the departure demand which we are really trying to satisfy in the most cost-effective manner. Therefore, these existing statistics already have built into them the inefficiencies of the current sizes of buses.

Typically, the demand levels by departure are not publicly recorded by the carriers and certainly are not expressed in a statistical manner suitable for our use in this study. It was, therefore, necessary to approximate what these demand profiles might be like. For this, we identified a high volume route which will be typical of the Voyageur Ottawa/Montreal or Montreal/Quebec City routes. A second type of route was also identified, which is a more conventional route with a low-level demand 90% to 95% of the time, with extra sections in the last 5% to 10% of the time. It should be noted that this second route is the typical bus demand, as best we can approximate it, and clearly does not show much advantage for larger buses. The cumulative distributions of demands are illustrated in Figure 4.4.

In the higher density routes, where frequency is already high, the alternative of introducing a larger coach for servicing the higher passenger demands could be feasible. Depending entirely on the specific demand distribution of the carrier, aggregate cost savings can be generated. For instance, for a typical high density route, the cost saving (see Table 4.3) would range from 0 to 3¢ passenger kilometres or 3 to -4% change in costs. It should be noted that the figures stated are meant only to be indicative of the scale of savings that can be achieved. From the cost model developed by this study, it is clear that the larger operator will be the most likely to beneift from larger buses, due to the nature of the demand profiles and his cost stuctures. The smaller operator is less likely to have passenger demands that can take advantage of the potential savings, and his cost structure does not give him the magnitude of benefits that the larger operators' structures do.

The influence of capital costs of the coach, while important, does not appear to be the most significant factor. Labour costs and coach capacity are much stronger influences in the economic model. Labour costs basically play the largest part in determining the magnitude of the cost benefits or penalties, while the seating capacity determines the duration (in passenger demand) of the economic benefit achieved in the second and third sections.

4.5 COST SUMMARY

From the foregoing analysis, it is clear that there are cost-saving windows which can be extremely beneficial for an operator. The analysis indicates that the larger operators will be more likely to benefit from higher capacity equipment, because of their higher fixed costs of operation and the likelihood of higher demand levels. Their cost structure allows them to have a slightly lower "risk" of losing money, while their gains in the second section are higher than those of the smaller operator.

Additional improvements in the economics of larger buses can be achieved primarily in two areas:

- a decrease in the capital cost of the equipment;
- a decrease in the per mile maintenance penalty assumed in the study.

If either of these two cost components can be improved, then the economics for larger capacity buses will improve so that they will have a higher chance of capturing a market segment.

However, the real problem in the bus industry is one of infrequent demands for second sections. From the market analysis, it appeared that the second section frequencies were low and the regular route service was of decreasing importance throughout the industry. Thus only the operators with high density routes will be interested in these pieces of equipment -- or the operators who are required, on a regular basis, to take large blocks of people from A to B, i.e., a sighteseeing operation or a tour attraction. Further, as pointed out in the marketing chapters, the operators will opt for increasing frequency of departure in preference to cost reduction through vehicle capacity, because the market will expand more by this technique than the costs can decrease through alternative equipment. With a few exceptions, such as Voyageur and Pacific Coach Lines, the frequency option will be the normal course of action in the face of high departure demand.

5.0 MARKET DEMAND PROJECTION

For the purposes of this study, there are two forecasts of the intercity bus market that must be considered. First is a forecast of passenger demand for intercity bus travel. Second, is an estimation of the demand for intercity coaches. The latter is a function not only of passenger demand but also of other economic factors.

In both cases, it should be noted that bus-specific forecasting models are in their infancy, making projections of this sort difficult at best. Problems with data availability only further compound the situation.

5.1 PASSENGER DEMAND

There are a number of variables that may influence the demand for intercity bus travel, although the effects of trends in three factors warrants special attention. These factors are the average age of the population, fuel prices, and growth in real income.

Historically, the intercity bus traveler has been characterized as being either young or old. The ICC study states that, in 1972, 47% of U.S. intercity bus passengers were under 18 years of age or over 65.[15] What is important to realize, however, is the shift taking place in the mean age of the population. Initially, the post-war baby boom shifted the mean age downwards, only to be followed in the 1960s by a progressively declining birth rate. The result will be a gradual aging of the population.

As far as the intercity bus market is concerned, the effect will be to reduce the number of younger passengers and, conversely, to increase the number of older passengers. The net result, however, may be that the one merely discounts the other, with no noticeable change in passengers. It is speculated that passenger revenues may decline due to the greater proportion of senior citizens who qualify for discount fares.[16]

Turning to fuel prices, intercity buses are presently the most fuel-efficient form of interurban passenger transportation. Data recently published by the American Bus Association (Table 5.1) illustrates that, in the U.S., the intercity bus is approximately 6 times more fuel-efficient than the air mode, and approximately 3 times more efficient than either the automobile or train. (It is also interesting to note the comparative efficiency of charter/tour service in contrast to regular route service. This is due to the higher passenger load factors experienced on charter/tour packages.) In 1979, Pitre estimated that in Canada the intercity bus is 2.5 times more efficient than the private automobile (intermediate sized), 2.2 times more than conventional rail, and 16 times more than intercity air travel.[17]

Fuel prices have risen drastically over the last decade, consistently outpacing the Consumer Price Index. Their continued escalation will exert strong inflationary pressures in both Canada and the U.S. All things considered, one would expect the result to be a shift away from the more fuel-intensive modes of intercity passenger transportation towards the bus mode.

However, fuel prices alone will probably not significantly effect the intercity bus industry's market share. Alternative projections made by the U.S. Federal Energy Administration in the early 1970s showed that large changes in fuel prices do not appear to create any significant long term changes in intercity bus ridership. Their findings were supported by the oil crisis, and the fact that while fuel prices nearly doubled, the number of intercity bus passengers decreased.[18] Thus, rather than decline, it is probable that the dominance of the private automobile within intercity travel will continue as more energy efficient models are designed and produced.

TABLE 5.1: ENERGY EFFICIENCY OF DOMESTIC INTERCITY MODES

kJ PER PASSENGER KM	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981 EST.
Intercity Buses All Services	689	684	627	650	663	644	641	623	645	645
Regular-Route Intercity Service	819	791	668	791	827	798	804	785	804	842
Charter and Special Service	452	452	437	437	437	462	455	444	460	444
Train (Amtrak)	2,393	2,331	1,977	2,331	2,066	2,218	2,393	1,935	2,021	1,895
Automobiles	2,049	2,101	2,049	2,049	1,999	1,999	1,999	1,955	1,906	N/A
Airlines (certificated)	5,900	5,900	5,206	4,917	4,658	4,425	4,023	3,848	4,023	3,688

Source: American Bus Association, Bus Facts. 1982 Edition, p. 9.

The third trend to consider is growth in real income. Although real income levels have been increasing, the rate of increase has been falling off. Future growth in real income per capita is forecasted to be marginal in light of the overall economic outlook. As stated in the 1980 Transport Canada study,

> "It is unlikely that the intercity bus industry can benefit from a weak economy. The demand for bus travel is both price-elastic and income-elastic; thus the industry likely would display the same trends as the rest of the economy."[17]

Earlier sections reviewed historical trends in certain variables, including both passenger kilometres and absolute number of passengers carried by alternative modes of intercity travel. This analysis indicated that, in recent years, the percentage of total intercity passenger kilometres accounted for by bus has decreased and has now, at best, stabilized. Furthermore, it would appear that the number of passengers carried has likewise stabilized. As for the shift in revenue contribution accounted for by both scheduled and charter/tour services, it can be concluded that any increase in the charter/tour segment will be offset by a corresponding decline in the much larger scheduled service segment.

Consideration of the effects in the US of deregulation relates to the market structure in terms of ease of entry and exit and will, therefore, be discussed when the demand for buses is projected. However, it is not expected to impact upon the passenger market demand.

In summary, the outlook for intercity bus travel throughout the 1980's may be described as one of flat demand and, in comparison to other modes, marginal market share loss. Increases in fuel prices, changes in the average age of the population, and the general economic outlook are not expected to favour the bus mode. Neither will improvements in service levels or deregulation have noticeable effects upon ridership in the forseeable future. Conversely, this outloook is likely to change only if these are significant modifications:

> "...government...subsidy policies, a severe recession, severe shortage of fuel or a sharp increase in fuel prices, drastic fare reductions, and dramatic improvements in bus facilities and service quality."18

5.2 BUS DEMAND PROJECTION

Given this projection of a declining market share and flat passenger demand, what will be the size of the North American intercity fleet and similarly, the demand for highway coaches through the 1980s? On the basis of ridership, the overall deduction would appear to be one of a similar flat demand for new buses and a consistent fleet size. There are, however, other factors that should be taken into account before committing to such a projection.

Once again, the U.S. intercity bus market data will be used as the primary basis of the forecasts. As stated in previous sections, the size of the U.S. market (in comparison to its much smaller Canadian counterpart) can be used as representative of the North American market as a whole. Furthermore, U.S. intercity bus market statistics contain greater detail and are presented in a form which permits an overview of the total industry.

A glance at the size of the U.S. intercity bus fleet (all classes) and at relevant indicators of fleet utilization over the last decade displays a reasonably stable picture. Referring to Table 5.2, it can be seen that the number of buses owned by the carriers reporting was 21,400 in 1980—

TABLE 5.2: U.S. INTERCITY BUS INDUSTRY - FLEET SIZE AND UTILIZATION

STATISTIC	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Number of Companies Reporting	1,000	1,000	1,000	950	950	1,000	1.050	1,100	1,200	1,330
Number of Buses	21,900	21,400	20,800	21,000	20,500	20,100	20,100	20,400	21,300	21,400
Total Bus kilometres (Millions)	1,934	1,902	1,896	1,923	1,812	1,799	1,799	1,770	1,856	1,870
kilometres per Bus (Thousands)	88.4	88.8	91.1	91.6	88.4	89.5	86.7	86.7	87.1	87.4
Revenue Passenger kilometres (Millions)	41,000	41,200	42,500	44,600	40,900	40,400	41,200	41,800	44,600	44,100
Estimated Bus Sales	--	--	--	--	--	—	1,420	1,500	1,600	1,800

Source: American Bus Association, Bus Facts. 1982 Edition, p. 2.

the same as 1972. This is somewhat more than the total fleet size during the latter part of the decade, a situation which is due to an increase in the number of carriers reporting. This increase is, in turn, a function of the increased number of small operators within the industry.

Conversely, the number of Class I carriers in the U.S. has declined from 71 in 1971 to 46 in 1980, and the number of buses operated by these carriers from 9,900 to 7,819.

Both total bus kilometres and average kilometres per bus depict an even more constant and level trend over the same period. Revenue passenger kilometres are, likewise, fairly uniform through the 1970s, although there is an increase in 1979 and 1980. This may again be attributable to the increased number of non-Class I carriers reporting and, therefore, the addition of their respective operating data, including passengers carried.

The estimated sales of intercity coaches shows increased purchases of equipment from 1977 through 1980. It is suggested that this is a function of efforts on the part of carriers to modernize their fleets following the wait-and-see attitude taken during the mid-1970s oil crisis, combined with, in some instances, a subsequent period of poor earnings which further inhibited new vehicle acquisition. This modernization may also be partially in response to increased activity in the charter/tour segment, and similarly the desire of charter/tour operators to upgrade their fleets with coaches of improved design, comfort and seating capacity.

Treated in isolation, however, this trend towards modernization has its ultimate limits and has perhaps already run its course. It is not expected to give rise to a significant or noticeable increase in new bus acquisitions in future years.

The Bus Regulatory Reform Act of 1982 will, as discussed earlier, have an influence upon the U.S. market structure. Ease of entry and the growth prospects presented by the charter/tour segment will attract an undefined number of small operators, and will likewise give rise to a marginal increase in new bus rates. These new bus acquisitions will not necessarily be made by the smaller operators, as the size of the majority of new entrants will perhaps preclude their purchase of new equipment and instead they will purchase used coaches. If this is the case, then the smaller operators will buy used coaches from established, larger carriers who, having now disposed of older units within their fleet, will be in the market for new, up-to-date coaches to meet the needs of their own particular markets.

Again, treating this one consideration in isolation, it is difficult to predict the exact effect of deregulation and, more importantly, the result in terms of new bus sales. However, the number of new carriers will be determined by the level of market demand and their ability to effectively survive in a profitable manner. Indications are that the deregulation of the Florida intercity bus industry quickly resulted in a saturated market. Closer to home, a number of new operators entering the Canadian market in recent years have run into difficulty, with some going under.[19] Thus, based on the total passenger demand (scheduled and charter/tour services combined) projected to remain flat, the new result on coach sales will be, at best, a marginal increase in new bus sales.

At the present time, there is a recurrence of the wait-and-see attitude witnessed during the oil crisis of the mid-1970s. This time, however, established operators are reacting to the uncertainty of what will happen as a result of deregulation, as well as interest rates and the high capital cost of new coaches. Conversations with bus retail firms indicate that 1982 year-end sales will not meet expectations, and will be below 1981 sales. Eagle projected a production of 600 coaches during 1982, but is presently estimating approximately 400; this is below the 1981 figure of 450 buses. MCI sales in Canada were in excess of 200 in

1981, whereas that firm is now projecting 50% of this for 1982. In both cases, the outlook for 1983, based on bookings to date, suggests that sales will be below the levels experienced in recent years.[20] The current economic problems are compounded, as indicated by B. Chaddock of Hausman Bus Sales, by the carriers' cautious wait-and-see attitude, combined with their customary tendency to not forecast their own markets and, therefore, their equipment needs.

A short-term projection through 1983 would therefore indicate that sales of new highway coaches will be down from the estimated 2,244 sales in 1981. In light of the foregoing considerations, a total sales figure for North America of 2,000 buses may be quite reasonable.

Annual sales of 2,000 may likewise be a reasonable minimum sales scenario in North America through the 1980s. This projection is premised primarily upon the forecasted flat passenger demand, and largely discounts any significant shift resulting from deregulation in the U.S. market. (The advent of any similar regulatory changes within the Canadian market would have even less effect, due to that market's smaller size.) Furthermore, this projection excludes any consideration of drastic changes in government policies regarding subsidies, fuel prices, fare levels, etc.

In support of this projection is the consideration that the industry, seeing no trend towards increasing traffic, will curtail its acquisition of new conventional equipoment, let alone entertain the idea of high capacity equipment. The same levels of service will therefore prevail, and should the economy pick up and intercity travel increase the bus mode will continue to look less than attractive.

Given 2,000 coaches as the minimum sales scenario, a maximum sales scenario can then be developed using more optimistic assumptions. With an easing of the present anticipation surrounding deregulation in the U.S., a marginal net increase in total passenger volume (and, therefore, bus demand) as a result of growth in the charter/tour segment, and a continued decline and stabilization of interest rates, an increase in bus sales and a net larger intercity fleet could be developed. The order of magnitude of this increase is not clearly quantifiable. However, in general, suppliers suggested a maximum sales scenario of 2,300 buses per year as a feasible upper limit.

Another means of projecting the intercity bus market is to estimate the turnover of the fleet based upon the average age of vehicles operated. Earlier, we noted that both Greyhound's and Trailway's fleets fell in the 6 to 7 year range. Although these two carriers combined account for a sizeable portion of the total intercity fleet, there are numerous other Class I and non-Class I operators which, collectively, own a far greater percentage of the fleet. Moreover, it is proposed that the average age of buses operated by the smaller carriers is older than that shown for Greyhound and Trailways. An overall mean average fleet age of 10 years may be representative.

Using 10 years as an estimate of the life of a typical intercity coach, we can therefore infer that there is a 10% turnover of vehicles every year. At present, there are between 22,500 and 23,000 highway coaches in service in both Canada and U.S.. Thus, the "10% factor" would forecast new coach sales in the order of 2,250 to 2,300 per year. Of course, this is dependent upon the average vehicle life used; increasing the age in consideration of the undefined number of older buses operated by small charter/tour operators, private organizations, etc., would naturally have the effect of decreasing the estimated annual sales figure.

6.0 POTENTIAL MARKETS FOR HIGH CAPACITY BUSES

The intent of the following section is threefold:

- to identify, from among alternative intercity coach configurations, identify which bus design is preferred by carriers;
- to identify those factors, whether perceived or real (i.e., regulatory), which may limit the introduction of a high capacity bus configuration;
- to identify the probable markets for high capacity buses, and the size of these markets.

6.1 CONFIGURATION PREFERENCE

The alternative design configurations of intercity buses which were considered in this study, and which were likewise investigated with the carriers surveyed, are:

- the conventional 12.2m coach
- the articulated coach
- the double-decker coach
- the jumbo articulated double-decker coach.

The intercity bus market is a fairly heterogenous one, composed of carriers which range from the single bus owners to the industry giant, Greyhound. These operators provide a variety of services, and exhibit varying degrees of sophistication in terms of managing their operations. In another respect, however, it is a very homogeneous market; the standard 12.2m, double rear axle, Detroit Diesel and Allison transmission equipped coach comprises the almost universal backbone of the industry at present.*

By the same token, it is safe--if not particularly surprising--to conclude at the outset that, based on the interviews, the preference of the vast majority of intercity carriers is for this same conventional 40' coach. There are a number of fundamental, rational, and also subjective reasons underlying this preference, each of which will be presented below.

On the other hand, one of the study objectives was also to identify which of the alternative high capacity buses is preferred, despite the unequivocal preference for the conventional coach. The preferred high capacity design and the reasons for this preference will likewise be discussed in this section.

6.1.1 Flexibility and Standardization

One of the most important factors underlying this preference for the 40' conventional coach is what may be referred to as its perceived "flexibility". From the interviews, it became apparent that this attribute takes several forms. In one context, it refers to the ability of the composite carrier (i.e., one which provides scheduled, charter/tour, and perhaps other services, including airport, suburban commuter, etc.) to assign a given bus to any part of its operations as the need arises. East Coast Parlour Tours gave the example of reassigning coaches betweeen its 15 departure per day Atlantic City run and the long distance tour packages they run. Similarly, American Sightseeing values this flexibility because it allows that company to switch its coaches from long distance tours to local sightseeing service during the off season.

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* Recognizing that there are various options in terms of seating capacity, the window design, and in whether it comes with or without toilet, other interior appointments, etc.

Many similar examples were provided by the other carriers surveyed.

Also of value to the carriers is the flexibility afforded by a conventional coach within any one particular service. Using scheduled services as an example, the dispatcher can add or subtract extra sections in response to demand fluctuations in lieu of a more permanent change in scheduled departure frequency. Once again, seasonal factors are usually a contributing factor to this sort of situation.

However, the fluctuations may be consistent enough in pattern to warrant a change in scheduled departures. An example of this is the Bonanza Bus Lines route described earlier: rather than add extra sections to already scheduled departures, Bonanza extended the schedule (i.e., earlier departures) and increased the frequency of departures. Designed to improve customer service through greater frequency and to increase passenger volumes, this operating mode is greatly facilitated by the uniformity and flexibility of the conventional coach.

The attribute of flexibility also relates to a consideration of bus maintenance and repair. Although coach design and interior appointments may vary, the current generation of intercity buses are more or less standardized with respect to two key components, namely, the power plant and transmission. Detroit Diesel Allison enjoy virtually exclusive use among North American highway bus manufacturers.

This standardization, as far as the carriers are concerned, has unquestionable merit in terms of the performance of mechanics, spare parts inventory and the resale of used coaches to other operators.

Standardization also enhances the perceived flexibility and reliability of the conventional coach when equipment is chartered to another operator or any particular vehicle is utilized on long-distance tours: if the unit breaks down en route, it is reasonable to assume that a qualified repair facility will be found.

6.1.2 High Capacity Design Preferences

Notwithstanding their preference for the conventional 40' coach, which of the existing high capacity designs would the intercity carriers prefer? Based upon a relatively small but representative survey sample, indications are that they prefer the double-decker bus (regardless of whether the carrier himself would actually acquire and use a high capacity bus in his own fleet).

In response to an idealized situation question, several carriers commented that the double-decker units presented marketing and promotional potential. At the risk of generalizing, this would be true more of the charter/tour operators who perceive the physically high design as innovative and eye-catching. More specifically, they could envision ways of "doing it up," and using the coach literally as a rolling advertising piece.

As indicated above, and as will be further discussed when identifying probable markets, one of the market sectors most likely to buy a high capacity bus is the one composed of the operators involved in charter/tour services, principally those who provide local sightseeing and short tours.

Although the performance and driveability of all high capacity buses was suspect in the minds of many carriers, the double-decker seemed to be preferred in this respect over the articulated or jumbo. This opinion would appear to be centered around considerations of stability, whereas it was felt that the rear section of the articulated bus would tend to fishtail. It should be noted that this and many other opinions expressed are not based on firsthand experience in operating a high capacity bus.

6.2 FACTORS LIMITING INTRODUCTION OF HIGH CAPACITY BUSES

It is perhaps to be expected that carriers and others involved in the industry find many more reasons not favouring, rather than favouring, the penetration of the market by high capacity buses. Perhaps this is due to the overwhelming preference of carriers for the conventional coach and the very small number of high capacity buses in operation throughout North America, which gives rise to a lack of experience and knowledge.

A number of the carriers' negative reactions relate to the lack of flexibility they perceive a high capacity bus provides. To a large extent, these are simply the opposite side of the coin to the reasons given to justify their preference of the conventional coach.

6.2.1 Switching Services and Off-Season Applications

Individual carriers, as has been noted, value the flexibility of being able to assign a bus to different services within their operations. Consequently, they feel they would lose this flexibility when incorporating a high capacity bus within their fleet even though its operation may be justified in one particular service (i.e., tours) and, considering operating costs, it may be impractical to attempt to run it in another service (e.g., a scheduled service route with low passenger load factors).

Similarly, if the carrier does not have the option of reassigning a conventional coach to another service or chartering it to another operator during an off season, then he may, as a last resort, park the bus until needed again. Once again, however, the perception of many carriers is that the high capacity bus has a correspondingly high price tag and operating costs and, thus, they could not afford to have it sitting idle.

6.2.2 Service Frequency vs Bus Capacity

It has been noted earlier that the preferred operating strategy within the scheduled service market is to increase frequency as opposed to adding extra sections. This was also a factor mentioned in favour of the conventional coach. Conversely, it was stated that a high capacity design would not lend itself to such a strategy; even if the high capacity bus could be economically run on specific high volume departures, the carrier is again confronted with the problem of what to do with the high capacity, high cost unit during lower passenger volume periods.

Similarly, the larger operators believe that these same factors would limit the resale of a high capacity bus to a smaller, more service-restricted operator.

The analogy of the airlines which are currently confronted with the dilemma of what to do with high cost but idle jumbo jets was voiced several times during the interviews.

6.2.3 Maintenance and Repairs

Even though the interviewees, as requested, assumed that each of the alternative designs would employ standard North American power plants and drive trains, some felt that other nonstandard components and technology would pose problems. Problem areas cited included:

- necessity and cost of carrying additional parts in inventory;
- incompatibility with maintenance facilities, whether height of garage doors (double-decker) or length of bays (articulated);

- concern over being able to receive adequate manufacturer service attention for a non-uniform coach type,*
- concern that a non-conventional coach, characterized by the above problems and a high price tag, would be difficult to sell on the used market.

6.2.4 Capital and Operating Costs

The carriers' perception of the high capacity bus's capital and operating costs would be an additional limiting factor. Regardless of cost per seat comparisons with conventional coaches, carriers would be deterred by what they consider to be a very large capital outlay (or, similarly, lease cost payments) and the subsequent effect of this upon their cash flow. Even at present, the consensus is that the $160-190k Canadian cost of a conventional coach is too high.

The depreciated value of a used high capacity coach, one suspects, would also remain high and would restrict its resale potential.

In the absence of any great degree of knowledge to the contrary, the carriers automatically assume that high capacity buses cost more to purchase, but would likewise cost substantially more to run, whether in absolute dollars or in terms of cost per seat kilometre. A prime example is the frequently mentioned assumption that the gas consumption of a high capacity bus would be significantly greater. In reality, however, this is not true, as Leisure Time Tours found with the 12 Neoplan double-decker units they are operating. They achieved 42 L/100 km (U.S.) with the Neoplans, as opposed to approximately 42.8 and 39.2 L/100 km (U.S.) on MCI and Prevost buses respectively, which they also operate.

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* Specifically, this was rumoured as one reason limiting Neoplan's success in the market. Conversely, it was emphasized that the introduction of a new design must go hand in hand with a high level of customer service attention and regard for customer satisfaction.

6.2.5 Road Restrictions

The issue of vehicle size and weight regulations and the extent to which these would restrict the introduction and operation of a high capacity bus was previously investigated in some detail in an earlier study carried out by N.D. Lea & Associates.[21] and the reader is referred to that report for specifics of various state and provincial regulations. Of importance, however, are the conclusions reached in that study, namely:

- that these regulations, as they presently exist, do prevent the unimpeded operation of high capacity buses throughout North America;
- that there are, however, no insurmountable barriers to the subsequent amendment of these regulations at a future date.

The initial introduction of a over-sized bus does not appear a problem from the Lea analysis and also the operator comments collected in this study. This is due to the site-specific nature of the first application of high capacity buses. Generally speaking, it is expected that, where restrictive regulations do exist, the carrier will be able to obtain an operating waiver. A case in point is the Leisure Time Tours operation of double-deckers in New Jersey. There are similar instances of waivers in urban operations as well that support this argument.

The regulatory process for vehicle dimension changes is generally a slow state by state process. However, occasionally th U.S. Federal government will overide state authority in the areas, as they did in January, 1983 when '102" width standard' was enacted. This new standard while not affecting the results of this study (i.e., the extra width does not change the seating capacity of coaches only the level of comfort), does show that it is possible that, given proper lobby pressure, 'across-the-board' changes in height or length regulations are possible. If these were made there would be an obvious stimulus to the market for larger coaches.

6.2.6 Past Attempts at Market Penetration

When queried as to what prospects they felt would be presented by an additional bus manufacturer or a significantly new coach design (such as a double-decker or articulated), a number of those interviewed referred to the bus industry's track record and lack of success in this regard. The example of Continental Trailways' articulated coach demonstration project in the early 1960s was cited and mention was also made of past efforts by Mercedes Benz and other manufacturers to penetrate the North American market.

Most recently, Neoplan's limited success in marketing their double-decker design in North America is viewed by some as indicative of the market's lack of receptiveness to alternative--or innovative--designs. The intercity bus industry is regarded by most as being very conservative; not only are the carriers inclined to stay with the conventional coach for the reasons described earlier, but most are inclined to take a "not me--let someone else try it first" attitude.

Another opinion voiced concerns the present domination of the market and the competition a new manufacturer or vehicle would meet. It was felt by many of the respondents that the dominance of the carrier market by Greyhound and Trailways and, thus, the bus production industry by MCI and Eagle would be a major deterrent. The obvious implication is that the potential, non-captive market available to a new coach would be severely restricted by the existing market structure.

6.2.7 Miscellaneous Considerations

Part of the survey briefly addressed the area of "downstream" facilities (hotels, rest-stops, restaurants, etc.). Respondents were asked whether they believed the passenger loads of high capacity buses would pose a problem in this respect. The opinion of the carriers varied. Some stated that they did not perceive any problem; a double-decker or articuated coach arriving with 60-70 passengers would be no different from two conventional coaches. Others, however, felt that there would be problems. The arrival, for instance, of two or more conventional tour coaches can be staggered, thereby not overtaxing the hotel's or restaurant's capabilities. A high capacity bus, some believed, would place heavy demands in this respect and as well upon the driver (e.g., baggage) and tour escort, if one is provided.

However, inasmuch as this question of downstream facilities was only lightly touched upon and because we did not survey the opinions of the hotel and restaurant industry per se, no definitive conclusions are possible at this stage.

Isolated and infrequent mention was made of upper-deck security on the double-decker bus, and of the fact that high capacity buses did not present the "right image" to the tour market. Again, no definitive interpretation is possible at this time.

6.3 MARKET SIZE

To a degree, it is possible at this stage to identify the nature or characteristics of the probable markets for a high capacity bus. More appropriately, these should perhaps be referred to as market niches, rather than market segments in the conventional sense. As indicated, the operation of high capacity buses will be very site-specific.

For the same reason, it should, therefore, be apparent that an identification of the size of these market niches is, on the other hand, not possible. There is no reliable model available to quantify the demand and an estimate of the market size, therefore, can only be achieved in an arbitrary fashion.

6.3.1 User Characteristics

First, let us summarize the characteristics of the markets that are potential customers for high capacity buses. There are:

Scheduled route operators who:

- have high volume routes with correspondingly high load factors which frequently require extra sections;
- will not opt for departure frequency increases (revenue generating) but will attempt to minimize servicing costs;
- can effectively utilize a high capacity bus approximately 50% of the time in order to realize the operational savings;
- are sufficiently educated and convinced of the benefits afforded by a large bus;
- are not deterred by the sizable capital outlay;
- are not restricted in the physical (vs regulatory) sense by infrastructure limitations (i.e., bridge heights, terminal layouts, etc).

Charter/tour operators who:

- have consistently high, year round group sizes in excess of 47 passengers;
- operate short to medium distance tours in the middle to upper price range;
- are large enough to incorporate a high capacity bus within their fleet.

Suburban commuter operators who:

- o have regular passenger loads which can economically support the operating costs of a high capacity bus;
- o are not otherwise forced to run used coaches for reasons of inadequate revenues due to suppressed fare structures.

6.3.2 Market Size Estimate

Although a precise and quantitative identification of the probable market for high capacity buses is not feasible, a rough estimate is, on the other hand, perhaps possible. It is to be emphasized that this estimate is based upon the qualitative and subjective findings of the study's research and carrier surveys. Specifically, it is proposed that there are four operational considerations which limit or "filter" the composition of this probable market.

As a starting point, the total North American intercity bus fleet was estimated to consist of approximately 23,000 units. This includes an undefined number of urban, suburban and school buses operated by what are otherwise classified as intercity carriers and no doubt is a marginal overstatement of the number of true highway vehicles.

The first filter to apply is an estimate of the number of carriers which are considered large enough to entertain the purchase of a high capacity bus. For this purpose, carriers with fleet sizes of 10 or more vehicles were chosen; reference to the frequency distribution of carriers by service type and fleet size discussed earlier in this report showed that approximately 90% (20,700 buses) of the North American fleet falls into this category (Table 6.1).

It was next assumed that within this segment only 5%-10% of the departure times on routes (whether scheduled and/or charter/tour) have consistently high annual departure densities which would economically justify the use of a larger coach on a continuous basis.

TABLE 6.1: MARKET ESTIMATE FOR HIGH CAPACITY BUSES

FACTOR DESCRIPTION	ACCEPTANCE FACTOR	% OF BUSES	NO. OF BUSES
	1.0	100%	23,000
Fleet Size more than 10 Buses	.9	90%	20,700
Routes with Consistently High Annual Departure Density	.05 - .10	4.5% - 9.0%	1,035 - 2,070
Sufficient System Integration	.20 - .50	0.9% - 4.5%	207 - 1,035
Capacity Accommodation vs Increased Departure Frequency	.20 - .50	0.18% - 2.25%	41 - 518
			Est 40 -- 520 Buses

To elaborate, this could in fact mean that a particular route requires an extra section at one specific departure time, but not at others. (The 5%-10% range is considered to be a maximum scenario.)

However, to integrate a high capacity bus within their system, the operators would need a sufficient number of these high density departures in order to effectively utilize and economically justify that coach. Again using a range, it is proposed that 20%-50% of the operations -- and, therefore, buses--that so far qualify would subsequently fall into this category.

Finally, it was noted that the majority of operators would opt for additional departure frequency as opposed to adding extra sections if required on a consistent basis (and as opposed to employment of a high capacity bus). It is estimated that this would apply to 50%-80% of the operations that qualify to this point, whereas the high capacity bus conversely would be applied to 20%-50% of the operations.

Reference to Table 6.1 illustrates the step-wise effect of applying these market filters. The result of this process is an estimated total long-term market of 40-520 high capacity buses.

Any one of the four filters applied is open to debate as to the numbers used; they are, however, considered to be directionally valid. Furthermore, there are other factors which, one could argue, should perhaps be included: for instance, restriction of the market by existing carrier/manufacturer affiliations.

There is also the question of the rate of market penetration. It is estimated that this would take a minimum of 5 years and upwards of 10 years. There are, therefore, two annual bus production rates which may be theorized.

This admittedly wide range may be further divided into three subgroups based upon the probability of attaining each of the three levels of sales. These three divisions, referred to as base, probable and possible, are defined as follows:

- o **Base**
  - the new bus is more costly per seat than current and conventional equipment;
  - the product is of acceptable design;
  - total intercity bus industry demand is flat;
  - the carriers are operating with limited resources and low profits;
  - there is limited experimentation and demonstration by operators.
- o **Probable**
  - factors are a blend of **base** and **probable**.
- o **Possible**
  - the bus has the same as, or a lower cost per seat than a conventional bus;
  - the industry is growing in size;
  - the carriers are financially healthy;
  - the product is considered by the operators to be above average;
  - the bus supplier has a high quality service network and reputation;
  - there is a willingness to experiment with new options.

Given these market conditions, the following sales volumes could then be achieved over the first 5-10 years of production:

Base	-	40 - 100 units
Probable	-	100 - 300 units
Possible	-	300 - 520 units

6.3.3 Potential Applications

Examples of operations which could possibly give rise to such block orders, and which could also be the sites of early applications of high capacity buses, include:

- Voyageur. They have already tested and proven the feasibility of an articulated coach on their high density, Montreal-Ottawa run. An estimate of their possible total requirement for articulated buses is between 15-20 units.
- Pacific Coach Lines. Likewise, they have briefly tested a double-decker on the Vancouver-Vancouver Island land/ferry operation. The double-decker provides capacity without taking up valuable deck space. A total of 40 double-deckers could conceivably be operated.
- Major operators in the U.S. northeast corridor. Leisure Time Tours is an example; they are presently running 12 double-deckers, mainly on the Philadelphia-Atlantic City route.
- Major tour operations in locations such as Florida and California which have high volume attractions such as the Disney sites.
- Suburban commuter operations in major metropolitan centres with consistently high volume departures (e.g., GO Transit in Toronto).

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APPENDIX A

SURVEY QUESTIONNAIRES AND DISCUSSION OUTLINES

INTERCITY BUS MARKET STUDY QUESTIONNAIRE

Respondent Company
Name: ______________________
Address: ______________________
____
____
____
Person Interviewed: ______________________
Position: ______________________
Interviewer: ______________________
Date: ______________________
Location: ______________________

I am ______________________ from Hickling-Partners Inc., an Ottawa, Canada based consulting firm. We are presently conducting a study of the North American intercity bus market for our client, the Transportation Development Centre.

Our objectives are twofold. First, to determine where the intercity bus market is going -- to project the demand for intercity bus travel, in total and by service type. Secondly, we wish to address the question of bus design. In other words, depending upon projected passenger demand, economic factors and other considerations, is there a viable need for alternative configurations or service options.

With these objectives in mind, I would like to take some of your time to ask a number of questions regarding your particular operations, and as well, your thoughts regarding the intercity bus market.

(Note: for US operators, suggest defining what we mean by "intercity". In the US, intercity means interstate scheduled, tour and charter tours. Otherwise, they refer to intrastate, which likewise includes scheduled service between 2 points, and charter/tours).
By "intercity", we mean scheduled, charter, tour, suburban commuter, etc. services requiring the use of highway, as opposed to urban, coaches.

First of all, do you provide intercity services of this sort, and therefore operate highway coaches. (If "no", terminate interview. If "yes", continue.)

SECTION A - GENERAL (All respondents)

Q.1 What types of services do you currently provide? (unprompted - check services mentioned.)

	Q.1	Q.2
1.1 Urban transit	☐	☐
1.2 Regular/Scheduled (intercity, intra- or interstate and provincial)	☐	☐
1.3 Suburban commuter	☐	☐
1.4 City/urban tour or sightseeing	☐	☐
1.5 Long distance (out-of-town) tour	☐	☐
1.6 Charter service	☐	☐
1.7 Airport Limousine Bus Service	☐	☐
1.8 Other (describe)	☐	☐

____

____

Q.2 You don't provide? (list services not checked off for Q.1, and check if "yes".)

Q.3 Could you please tell me approximately how many highway-type bus coaches are you currently operating (as opposed to urban transit type vehicles and excluding school buses)? #_____

(Comments)____

____

____

Q.4 Can you also give me an estimate of your highway coach fleet in terms of age? (% or absolute #'s). How many, or what percentage are (read)

	Q5 #/%
pre-1960	_____
1960-65	_____
1966-70	_____
1971-75	_____
1976-present	_____
TOTAL	_____

(Comments) ____________________

____

____

Q.5 What would be the approximate total annual mileage of your fleet (all services)? __________ miles

Q.6 Do you happen to know what would be a representative, or typical annual mileage for one of your highway coaches? __________ miles

(Comments) ____________________

____

____

Q.7 Does this typical vehicle mileage change in relation to the service in which it is used? In other words, is the mileage different for a bus in scheduled intercity, suburban commuter, charter, tour, A/P limousine, etc.

Yes ☐

No ☐

(Comments) ____________________

____

____

Q.8 I would like to get an idea, if possible, of your fleet composition. Could you tell me the # of buses according to manufacturer, and perhaps even the model and seating capacity.

	# OF BUSES	MAKE	MODEL	SEATING CAPACITY
8.1	____	________	_____	_______
8.2	____	________	_____	_______
8.3	____	________	_____	_______
8.4	____	________	_____	_______

Q.9 (If more than 1 intercity service) For the services that you provide, could you please give me an idea of the relative size of each part of the operations? A percentage of total revenue, cost or mileage accounted for by each would be fine, or the average # of buses in each service (Check which used).

Revenue ☐ Cost ☐ Miles ☐ Buses ☐

1.1 Urban transit ___

1.2 Regular/scheduled ___

1.3 Suburban commuter ___

1.4 City/urban tour ___

1.5 Long distance tour ___

1.6 Charter ___

1.7 Airport Limousine ___

1.8 Other (describe) ___

(Comments)____

____

____

Q.10 When adding to your fleet, do you generally buy new or used coaches?

9.1 New ☐

9.2 Used ☐

9.3 Both ☐

9.4 (if used) Who do you normally buy these from?

____

____

____

Q.11 Over the last ten years, what would you estimate to be the average annual # of coaches bought?

average # __________ per year

(or) Total __________

Q.12 During the coming year (1983) will you be acquiring new vehicles? ("new" meaning new per se, or used)

12.1 Yes ☐ (go to Q.13)

12.2 No ☐ (skip to Q.15)

Q.13 How many vehicles will you be acquiring?

# ______

Q.14 How many are intended as straight replacements, and how many are additions to fleet?

14.1 replacements # ___

14.2 additions # ___

Q.15 Would you mind telling me what make or type of coach you are intending to buy, and the number of each?

	MAKE	#
15.1	____________	____
15.2	____________	____

Q.16 When disposing of buses you no longer require, who is customarily the buyer of these?

____

____

____

Q.17 How are your buses financed? Are they (read):

		Q.17	Q.18
17.1	owned/bought outright	☐	____
17.2	bank financed	☐	____
17.3	manufacturer financed	☐	____
17.4	leased	☐	____

Q.18 (If more than one category), Can you tell me how many are (read categories checked)?

Q.19 Changing the subject somewhat, do you have a means of determining the effective utilization of your buses, and what is considered to be an acceptable utilization of any given vehicle?

19.1 method ____________________________

19.2 acceptable rate ____________________________

19.3 (probe if no method) For instance, could you use mileage run as a means of indicating the effective use of your fleet?

____

____

Q.20 When deciding whether or not to purchase new equipment, and what type of equipment to buy, who is responsible for making the decision? (i.e., the title or position)

____

____

____

Q.21 What factors are taken into account in this decision process? In other words, what criteria are used to justify the purchase of a new vehicle? (unprompted)

21.1 ______________________ ☐

21.2 ______________________ ☐

21.3 ______________________ ☐

21.4 ______________________ ☐

Q.22 Could you give me a ranking on these? Which has the most importance and bearing on the decision, which is second, etc. (Number those listed in Q.20 in order of importance).

Q.23 Does your company have a corporate goal for return on investment, and if so, do you mind me asking what it is?

23.1 Yes ____ 23.2 No ____ 23.3 ____%

(Note: End of Section A - General. Continue with Section B - Tour, C - Charter, D - Scheduled as appropriate. Section E - HCB's for all respondents.)

Operating Costs*

	Total	¢/Mile	% of Total
Fixed (capital/lease)	____	____	____
Fuel & Oil	____	____	____
Maintenance & Repairs	____	____	____
Driver	____	____	____
Other (incl. overhead allocation)	____	____	____

* For handing to respondent if operating costs are to be obtained at later time.

SECTION B - TOUR SERVICES

Q.1 Now I would like to ask you some questions about your tour operations. First of all, are your tour packages:

	Q.1	Q.2 DAYS	Q.2 MILEAGE
1.1 Local (i.e. intrastate or intraprovincial)?	☐	___	___
1.2 Long distance (i.e interstate or interprovincial)?	☐	___	___
1.3 Other (describe)	☐	___	___

Q.2 In terms of trip time (i.e. days) and one-way mileage, what do you consider to be a typical local and long distance tour package?

Q.3 Could you please give me some idea of the (local and/or long distance) tour packages you offer? For instance, where do they go, what is the feature attraction, etc.? (general probe question - indicate whether local or long distance)

3.1 ______________________________

3.2 ______________________________

3.3 ______________________________

3.4 ______________________________

Q.4 In general, would you say that these tour packages are very seasonal, somewhat seasonal, or not seasonal?

4.1 Very ☐ (go to Q.5)

4.2 Somewhat ☐ (go to Q.5)

4.3 Not Seasonal ☐ (skip to Q.7)

Q.5 (Probe for causes) Why is that? What causes this seasonality (other than the obvious)?

____

____

____

Q.6 (If very/somewhat seasonal) In the off-season, what do you do with the buses? (don't read)

6.1 park them ☐

6.2 other services in your company ☐

(describe) Which? ______________________________

____

Are these additional units or substitutions?

____

____

6.3 charter/lease to others ☐

(examples) For instance, who? ______________________________

____

Q.7 What type of vehicles do you tend to run in your tour operations? (unprompted)

____

____

____

Q.8 (If age of vehicles not mentioned in Q.7) Is the age of the tour vehicles different from those used in other services, and if so, in what way?

8.1 Yes ☐ 8.3 ____________________

____

8.2 No ☐ ____________________

Q.9 Who organizes these tours? In other words, are they put together and run by yourselves, or are they handled through agents/brokers?

9.1 directly ☐

9.2 agents ☐

9.3 both ☐

9.4 other ☐

(describe) ________________________________

____

____

Q.10 For the last full operating year, could you give me an estimate of the:

10.1 Total # of tours run per year (i.e. trips, not # of buses)? # ________

10.2 The number of tour passengers carried? # ________

(Note: May have to obtain this through follow-up)

Q.11 Could you also tell me the % of times, in your opinion, that the tour groups were:

	%
11.1 Less than 35 passengers	________
11.2 36-45 passengers	________
11.3 46-70 passengers	________
11.4 71-100 passengers	________
11.5 Greater than 100	________

(Note: May require follow-up later)

Q.12 (If "no to Q.11) What about the average size of the tour groups? What's your estimate?

Average Size _______

Q.13 Let's look at the # of buses per tour trip, or departures. As a % of all tour trips, how often would you say that the # of buses per tour departure is:

	#
13.1 Only 1	_________
13.2 2	_________
13.3 3	_________
13.4 More than 3 buses	_________

Q.14 (If "no response" to Q.14) In your opinion, what would you estimate the average # of buses per tour trip to be?

Average # __________

Q.15 What factors would you say determine the size of tour groups; i.e. the # of passengers per tour group?

____

____

____

(probe as necessary) __________________________

____

____

Q.16 Is there any relationship, do you think, between the size of the tour groups and the distance of the tour?

16.1 Yes ☐ 16.2 No ☐

16.3 (If "yes") What's the reason for that?

____

____

Q.17 Over the last 5 years, would you say the trend in your tour operations has been an increase, the same, or a decrease in the:

	INC	SAME	DEC
17.1 Total # of tour passengers?	☐	☐	☐
17.2 The average group size?	☐	☐	☐

Q.18 (If increase or decrease) What would you estimate the annual % of increase/decrease to have been in.

	INC	DEC
18.1 # passengers	___	___
18.2 group size	___	___

Q.19 What do you think caused this increase/stability/decrease (as indicated) in:

19.1 Total # of tour passengers? ______________________________

____

____

19.2 Average group size? ______________________________

____

____

Q.20 Looking down the road -- let's say 5 years -- what's the outlook? Do you think your operations will experience an increase, stability, or decrease in:

	INC	SAME	DEC
20.1 Total # of tour passengers?	☐	☐	☐
20.2 Average group size?	☐	☐	☐

Q.21 (if inc/dec) Again, could you quantify the average annual % increase/decrease in

	INC	DEC
21.1 # passengers	___	___
21.2 group size	___	___

Q.22 What do you think will be the reasons for this increase/stability/decrease (as indicated) for:

22.1 Total # of tour passengers? ____________________

____

____

22.2 Average group size? ____________________

____

____

Q.23 Now I would like to turn to attendants, or escorts? Do your tours have escorts?

23.1 Yes ☐ (skip to Q.25)

23.2 No ☐ (skip to Q.27)

23.3 Varies ☐ (continue with Q.24)

Q.24 (If "varies") What determines whether a tour has an escort or not?

____

____

Q.25 If a tour departure consists of more than 1 bus, is there an additional escort for each additional bus, or how do you handle this?

25.1 1 for each bus ☐

25.2 (Otherwise) ____________________

____

Q.26 Would you mind telling me what your standard labour costs are for escorts?

$ __________

Q.27 What about drivers of tour buses? Are they paid the same rate as for other services, less, or do they get a premium? If more or less, would you mind telling me by how much?

27.1 Same ☐

27.2 Less ☐

27.3 Premium ☐

27.4 Rate over/under basic $_____ or Total $_____

Q.28 Earlier, we were talking about tour groups sizes. Would you mind telling me what you consider to be the rule-of-thumb breakeven point in terms of # of passengers carried on a tour coach?

breakdown # passengers ________________________________

Q.29 (If # identified in Q.28) Could you give me some idea of how this breakeven # was arrived at?

____

____

____

SECTION C - CHARTER

Q.1 In order to distinguish between tour and charter bus operations, would it be fair to say that when running a tour operation you are attempting to fill up a bus (a tour package - either directly, or indirectly through an agent) and are therefore dealing with a number of passengers, while in a charter operation you basically have only one customer - the person (or organization) which charters the bus?

1.1 YES ☐

1.2 NO ☐

1.3 (Comments)

____

____

____

____

Q.2 When chartering out a highway (intercity) coach, who are your customers?

			Q3
2.2	Another bus operator?	☐	__%
2.3	An organization (club, group, association, etc.)?	☐	__%
2.4	Tour Agency/broker	☐	__%
2.5	Other (describe)	☐	__%

____

____

Q.3 Could you give me an idea of the percentages of charters accounted for by each of these?

Q.4 How many charters were booked, or made, during the last full year of operations (or last 12 or 6 months)? Not the number of buses, but the number of charters (assuming that a charter could have 2 or more buses).

Number of charters _____ for _____ months

(Note: Q.3 and 4 may require follow-up to obtain info).

Q.5 A charter could be for one, two, or more buses. In terms of a percentage of occurences, how often, would you estimate, is a charter for:

5.1 1 bus ____%
5.2 2 buses ____%
5.3 3 buses ____%
5.4 4 or more buses ____%

Q.6 (If charters to orgainzations, tour brokers, etc. Otherwise, ship to Q.9) I know it is difficult to identify the size of the groups when chartering to an organization, tour broker, etc (as opposed to another bus operator). However, in your opinion, what % of times would you say the charter group size is:

6.1 less than 35 ____%
6.2 35-45 ____%
6.3 45-70 ____%
6.4 70-100 ____%
6.5 more than 100 ____%

Q.7 (If no response to Q6) Alternatively, what do you estimate to be the average size of a charter group?

average size ____________

Q.8 Are there any reasons you can think of that determine the size of charter groups?

____
____
____

Q.9 Overall, how seasonal would you say your charter bus operations are?

9.1 Very ☐ (go to Q.10)
9.2 Somewhat ☐ (go to Q.10)
9.3 Not seasonal ☐ (skip to Q.12)

Q.10 (If very/somewhat, probe for causes) What factors influence this seasonality?

____
____
____

Q.11 (If very/somewhat seasonal) When the buses are not used for charter operations, what do you do with them?

11.1 park them ☐

11.2 other services in your company ☐

(describe) which? ______________________

11.3 other ☐

(describe) ______________________

Q.12 What type of vehicles do you tend to run in your charter operations? Do they differ from those coaches used in other services, and if so, how? (unprompted)

____

____

____

Q.13 (If age of vehicle not mentioned in Q.12) Does the age of the charter buses tend to differ from those used in other services, and if yes, in what way?

13.1 Yes 13.3 ______________________

13.2 No

Q.14 Over the last 5 years, would you say the number of your charters per year has increased, remained the same, or decreased?

13.1 increased ☐

13.2 same ☐

13.3 decreased ☐

Q.15 (If inc/dec) What average annual % of increase/decrease would you estimate there has been?

______________________ %

Q.16 Are there any reasons that come to mind why your charters have increased/remained the same/decreased (as indicated)?

____

____

____

Q.17 Looking ahead 5 years, what would you say is the outlook for your charter operations?

17.1 increase ☐

17.2 same ☐

17.3 decrease ☐

Q.18 Again, could you quantify the average annual % of increase/decrease you expect

____________________ %

Q.19 What do you feel will influence this increase/no growth/ decrease in charter business (as indicated)?

____

____

____

Q.20 Earlier, we talked about who your charter customer(s) is (are). In terms of the duration, or # of days, what is the pattern to these charters?

20.1 ______________________________

____

20.2 (Probe for other bus operator/an organization/tour agency, etc. as appropriate). Are there any differences between the different types of charter parties, and if so, what might those differences be?

____

____

Q.21 (If respondent offers more than charter services) At the start of this questionnaire, we identified the various services you provide. Does the cost of your charter operations differ in anyway noticably from other operations?

21.1 ______________________________

____

21.2 (probe) How?

____

____

Q.22 (If driver costs not mentioned) What about driver costs? Are they paid the same as your other drivers, and if not, what is the difference?

____

____

Q.23 On what basis does the customer pay for a bus charter? In other words, do they pay on the basis of a straight daily rate, mileage, a mixture, etc. Please describe

____

____

____

Q.24 In charter operation, is there a rule-of-thumb breakeven point in terms of when you do or don't make money? If there is, could you describe it to me please?

____

____

____

____

(End of Section C - Charter)

SECTION D - SCHEDULED/REGULAR SERVICE

Q.1 Let's look more closely at your scheduled, linehaul passenger service. To start with, do you provide

1.1 local scheduled service? (intrastate or intraprovincial) ☐

1.2 long distance scheduled services? (interstate or intraprovincial) ☐

1.3 other (describe) ☐

____

____

Q.2 Could you give me some idea of the extent of these (local and/or long distance) scheduled services? For instance, the number of routes, typical distances, etc.

2.1 local service?

____

____

____

____

2.2 long distance services?

____

____

____

____

Q.3 Do you have any routes that require extra sections/buses on scheduled departures more than _____% of the time?

3.1 Yes ☐

3.2 No ☐

3.3 N/A ☐

Q.4 Without having the files and data at hand, I realize that this is a difficult question. However, could you perhaps give me some idea of which routes require extra sections (i.e. the lane, or origin/destination)

4.1 R#1 ______________________

R#2 ______________________

R#3 ______________________

R#4 ______________________

R#5 ______________________

4.2 In relation to the number of scheduled departures, how often would you estimate that extra sections are required expressed as a % of the total # of departures?

R#1 ______________________

R#2 ______________________

R#3 ______________________

R#4 ______________________

R#5 ______________________

4.3 To your knowledge, are there any routes that on occassion require more than 1 extra section? If so, could you tell me which ones, and could you also estimate the % of occurences (or whether this happens very rarely, rarely, frequently, or very frequently)?

R#1 How Often

____

____

____

____

Thank you. Before continuing with the questionnaire, at a later date we may wish to obtain more detailed route data; i.e. for high volume routes requiring extra sections, such information as departures, # of passengers, sample loadings, etc. If we can obtain and use aggregate data from ICC/Stats Can, then fine. Otherwise, would you be agreeable to providing such information, and if so, who might we contact within your organization? Please rest assured that any information provided would be treated with discretion, and in confidence.

Yes ☐

No ☐

Contact name: ____________________

Tel # ____________________

Q.5 Getting back to the questions, is there any seasonality to your scheduled routes?

5.1 Very ☐

5.2 Somewhat ☐

5.3 Not seasonal ☐ (skip to Q.8)

Q.6 (If very/somewhat) What causes this (other than obvious)?

____

____

____

Q.7 Do you end up with spare buses during the off-season, and if so, what do you do with them?

7.1 Park them ☐

7.2 Other company services ☐
(describe) who? ____________________

7.3 Charter to others ☐
(describe) who? ____________________

Q.8 In your operations would you say the trend in the last 5 years has been an increase, the same/consistent, or a decrease in terms of:

	Inc.	Same	Dec.
8.1 total # of passengers	☐	☐	☐
8.2 average # of passengers/ per departure	☐	☐	☐

Q.9 What do you think has caused this increase/stability/ decrease in

9.1 total # passengers

____

____

9.2 average # passengers/departure

____

____

Q.10 Looking to the future, do you think you will experience an increase, stability, or decrease in

10.1 total # of passengers ☐ ☐ ☐

10.2 average # of passengers per departure ☐ ☐ ☐

Q.11 What do yu feel will give rise to this increase/stability/ decrease in

11.1 total # of passengers

____

____

11.2 average # of passengers/departure

____

____

(end of Section D - Scheduled Services)

SECTION E - HCB'S

Q.1 Now I would like to turn to the question of bus capacity. At present, in your opinion is there a need in your operations for a coach with a seating capacity different than the conventional 40 foot, 45-47 seat capacity bus? When answering this question, I would ask you to assume that the cost of operating a different capacity bus --- expressed in total operating costs, or cost per passenger mile --- is comparable to a conventional coach. Do you think there is a need at present, in your operations, for a different capacity bus?

1.1 Yes ☐
1.2 No ☐
1.3 N/A ☐ (skip to Q.5)

1.4 (if "Yes") In which services?

Q.2 Would you please explain why you think there is/is not a need?

(If "no need" skip to Q.5)

Q.3 (If "Yes" to Q1) Let's say that the cost of such a vehicle is more, and the cost per passenger mile therefore increases marginally above your present cost per passenger mile. Do you still believe there is a need for a different capacity bus?

3.1 Yes ☐
3.2 NO ☐
3.3 N/A ☐

Q.4 Could you elaborate on why you think that?

(Probe) Is there a cut-off point in terms of total bus cost, or cost per passenger mile beyond which you would not be prepared to go?

____

____

(skip to Q.7)

Q.5 (If "No" or "No answer" to Q1) Still thinking of your operations, and again assuming a comparable cost per passenger mile, do you think this need will change down the road? Let's say 5 years from now.

5.1 Yes ☐

5.2 No ☐)
) (Skip to Q7)
5.3 N/A ☐)

5.4 (if "Yes") In which services?

____

____

Q.6 (If "Yes" to Q5) What do you see changing, and therefore changing the need?

____

____

Q.7 Looking at the intercity highway bus market in general (intra and interstate, or intra and interprovincial scheduled, charter and tour services), in your opinion, is there a need at present for a bus of a different seating capacity in the intercity market? Again, please assume comparable costs per passenger mile.

7.1 Yes ☐

7.2 No ☐

7.3 N/A ☐

7.4 (if "Yes") In which services?

____

____

Q.8 Could you please explain why you think there is/is not a need?

____

____

Q.9 (If "No" or "No-answer" to Q7) And down the road, 5 years in the future? Do you see the need changing?

9.1 Yes ☐ (to Q10)

9.2 No ☐) (skip to Q11)
)
9.3 N/A ☐)

9.4 (if "Yes") In which services?

____

____

Q.10 (if "Yes" to Q9) What do you think will change, and therefore change the need?

____

____

(Note: if "no" to either present or future need in both own operations and intercity market in general, terminate).

Q.11 (If "Yes" to present and/or future need) What size of bus, in terms of seating capacity, do you feel is needed? Again, assume no additional cost per passenger mile, and also that acceptable design standards are met, and no regulatory restrictions exist.

Passenger capacity __________

Q.12 Of the altnerative design configurations available in North America or Europe, which type of coach or design, in your opinion, is preferable to meet the seating capacity you indicated? As before, please assume comparable cost per passenger mile, acceptable design standards throughout the alternative design configurations, and no regulatory restrictions.

12.1 smaller (e.g., 39') ☐

12.2 artic ☐

12.3 DDB ☐

12.4 DDB artic ☐

12.5 extended ☐

12.6 other ☐

(describe)______________________________

____

Q.13 What is it that you prefer about that particular design?

____

____

____

Anything else?

____

Q.14 As you no doubt know, there are other designs on the market. For instance (list those not picked). Why would you not pick (mention each in turn, and enter comments).

	Class	Comments
14.1	______	______________________________
14.2	______	______________________________
14.3	______	______________________________
14.4	______	______________________________
14.5	______	______________________________

Q.15 Thinking of the design you perfer the ________, is there anything, in your opinion, that might hinder the introduction of this coach into the intercity bus market?

15.1 Yes ☐ (go to Q16)

15.2 No ☐)
)   (skip to Q17)
15.3 N/A ☐)

Q.16 What might that be?

____

____

(Probe for design standards and regulatory restrictions)

____

____

Q.17 What do you think your drivers' reaction would be to a higher capacity bus in terms of:

17.1 vehicle performance

____

____

Why?

____

____

17.2 handling and carrying more passengers

____

____

Why?

____

Q.18 Would the incorporation of a higher capacity bus within your fleet impact on any of your facilities, and if so, in what way?

18.1 ______________________

____

18.2 Anything else?

____

18.3 What about garages, passenger terminals, etc? (list those not mentioned above)

____

____

____

Q.19 If you were to run higher capacity bases in your services, would this present any advantages you could employ in your marketing.

19.1 Yes ☐

19.2 No ☐

19.3 (If "yes" In which services?

____

____

19.4 What advantages would there be? How would it effect your marketing campaign?

____

____

____

Q.20 There are what I will call the "downstream" facilities, such as hotels, restaurants, rest stops, etc. Do you think a higher capacity bus would impact upon these? Could you please give me your thoughts?

____

____

____

____

____

Q.21 If you were to have higher capacity buses within your fleet, would the change in fleet composition be influenced by the number of such buses you could operate? In other words, would you have to have a minimum number to justify the change in fleet composition?

21.1 Yes ☐ (to Q22)

21.1 No ☐ (skip to Q.24)

Q.22 (If "Yes" to Q21) What factors or considerations would determine the number of higher capacity buses you should have?

____

____

____

Q.23 How many, or what % of your fleet, do you think you would necessarily require?

# ________________

Q.24 If we were to assume that a higher capacity bus were to be introduced to the market, aside from what we have already discussed are there any design features you can think of that should be taken into account? For instance, what about the powerplant and drivetrain?

24.1 ____________________________________

____

____

24.2 Interior design and appointments?

____

____

____

(terminate interview)

INTERCITY BUS MARKET STUDY

Discussion Outline A (for use with large operators; e.g. Greyhound, Trailways, etc.)

1. To start with, I would like to learn more about your particular scope of operations. Could you briefly clarify the type of intercity services (intra and interstate/provincial scheduled, tour and charter services, and suburban commuter and A/P limousine using highway coaches) you provide?

2. What is the relative order of magnitude of each of these services, whether in terms of revenue generated, operating costs, or number of buses employed in each?

3. Are there any differences in terms of the type of bus you run in each service? For instance, does the size, seating capacity, age or other factors determine which bus is put into which service?

4. Over the years there have been some attempts to introduce highway coach designs offering higher seating capacity. By and large, in North America these have met with a pronounced lack of success. Would you give me your thoughts on this?

   4.1 This question appears to be raised again, with talk of extended, articulated, double-decker, and even articulated double-decker coaches. Do you think the need for higher capacity buses is changing, and likewise, is there a future for a higher capacity coach of one sort or another?

5. In your own operations, are there services (either scheduled departures, tour or charter) where 2 or more coaches are required for a departure, and where a higher capacity bus of comparable cost per passenger mile could be employed to advantage? If so, could you describe these to me?

6. Has there been any thought given to designing and developing a higher capacity bus by your organization?

7. For the sake of argument, let's say that a need is identified within the intercity market for a higher capacity bus. How do you think your company would react? Moreover, what would determine whether you produce or do not produce a higher capacity bus?

8. Other than what we have already discussed, what roadblocks, if any, do you think exist to the development and implementation of a higher capacity bus? Please mention anything that comes to mind.

9. (For those items not already raised) What do you think the reaction would be to, or impact upon of, a higher capacity bus:

9.1 by drivers? (vehicle performance, carrying more passengers)

9.2 to terminal facilities?

9.3 to maintenance facilities?

9.4 by the consumer; i.e., the passenger?

9.5 to downstream facilities, such as hotels, restaurants, reststops, etc.?

10. Generally speaking, buses are generally passed "down the line" --- sold by larger opeators to smaller operators. Would this effect the introduction of higher capacity buses?

11. (If not already discussed) What about the regulatory enviornment? Given an identified need, and therefore a market for higher capacity buses, would regulatory legislation regarding design standards, length, axle loadings, etc. change accordingly, or would this be an obstacle?

APPENDIX B

SURVEY RESPONDENTS

SURVEY RESPONDENTS

ABA Convention*

COMPANY/ORGANIZATION	RESPONDENT
American Bus Sales**	T. Zarider, President
American Sightseeing	D. Leblang VP, Marketing
Bonanza Bus Lines, Inc.	G.M. Sage, President
Buslease, Inc.**	T. Curry, President C. Lentzsch, VP
Carolina Coach Co.	H.L. Creech, President
Custom Coach	J. Kruemer, Marketing
East Coast Parlour Tours	J. Smith, Marketing
Greyhound Lines of Canada Ltd.	J. Knight, President
Harvard School of Business	Prof. D. Wyckoff
Hausman Bus Sales**	W. Chaddock, VP
Martz Travelways	T. Patton, VP, Marketing
Michaud Travelways	J.A. Michaud, President
MCI, Canada**	J. Campbell Manager, Marketing
Trailways, Inc.**	S. Griffith Executive, VP
	M. Huddleston, VP Leisure/Charter

*Face-to-face personal interviews
**Telephone interview in addition

SURVEY RESPONDENTS

	COMPANY/ORGANIZATION	RESPONDENT
Telephone and Other Interviews		
	Canada Coach Lines Ltd.	J. Arnold Manager, Charters
	Gelco Equipment Leasing Co.	J. Senstie, Asst. VP Transportation Financing
	Gray Coach Lines, Limited	B. Stewart Director of Traffic
	Leisure Time Tours	G. Mercadante, President
	Greyhound Lines, Inc.	R. Pawlisz, Eng.
	Interstate Commerce Commission	W. Norms
	Munsen Discovery Experience	P. Munsen, President
	Music Mann Leasing, Ltd.	J. Civic, Gen. Manager
	Pacific Coach Lines Ltd.	B. Clark Traffic Manager
	Prevost Car Inc.	A. Normand, President G. Pelletier V-P, Sales and Marketing
	Travelways Ltd.	G. Mills Charter Manager
	Trentway - Wagar, Inc.	J. Develin, Chairman
	Voyageur Colonial Limited	P. McElligot, Director, Sales Promotion

APPENDIX C
COST MODEL OUTPUTS

TABLE C.1: INPUT DATA FOR MODEL SENSITIVITY TEST

COMPANY SIZE: LARGE OPERATOR	HIGH END COSTS				LOW END COSTS			
Seating Capacity	43	61	61	61	47	72	72	72
Bus Operating Costs								
Capital ($000)	200	250	300	350	180	250	300	350
Interest Rate	16	16	16	16	12	12	12	12
Utilization (km/yr)	160	160	160	160	240	240	240	240
Capital Cost/km	0.20	0.25	0.30	0.35	0.09	0.13	0.15	0.18
Fuel Cost ($/L)	0.44	0.44	0.44	0.44	0.31	0.31	0.31	0.31
Fuel Consumption	43	48	48	48	36	40	40	40
Fuel Cost/km	0.19	0.21	0.21	0.21	0.11	0.12	0.12	0.12
Maintenance Cost/km	0.20	0.25	0.25	0.25	0.15	0.19	0.19	0.19
Total Bus OPS/km	0.59	0.71	0.76	0.81	0.35	0.44	0.46	0.47
Driver Cost/km	0.60	0.60	0.60	0.60	0.50	0.50	0.50	0.50
Overhead Cost/km								
TOTAL COST/km	1.19	1.31	1.36	1.41	0.85	0.94	0.96	0.97

TABLE C.2: INPUT DATA FOR MODEL SENSITIVITY TEST

COMPANY SIZE: SMALL OPERATOR	HIGH END COSTS				LOW END COSTS			
Seating Capacity	43	61	61	61	47	72	72	72
Bus Operating Costs								
Capital ($000)	200	250	300	350	180	250	300	350
Interest Rate	16	16	16	16	12	12	12	12
Utilization (km/yr)	96	96	96	96	260	160	160	160
Capital Cost/km	0.35	0.42	0.50	0.58	0.14	0.19	0.23	0.26
Fuel Cost ($/L)	0.44	0.44	0.44	0.44	0.31	0.31	0.31	0.31
Fuel Consumption	43	48	48	48	36	40	40	40
Fuel Cost/km	0.19	0.21	0.21	0.21	0.11	0.12	0.12	0.12
Maintenance Cost/km	0.20	0.25	0.25	0.25	0.15	0.19	0.19	0.19
Total Bus OPS/km	0.74	0.88	0.96	1.04	0.40	0.50	0.54	0.57
Driver Cost/km	0.36	0.36	0.36	0.36	0.24	0.24	0.24	0.24
Overhead Cost/km								
TOTAL COST/km	1.10	1.24	1.32	1.40	0.64	0.74	0.78	0.87

```
BIG BUS COST ESTIMATING MODEL

 BASELINE BUS
 UNIT SEATING CAPACITY.... 43         BUS $/KM.......... .59
 DRIVER $/KM............. .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR BASELINE HI-LO COST COMPARISON
 UNIT SEATING CAPACITY.... 47         BUS $/KM.......... .35
 DRIVER $/KM............. .5        OVERHEAD $/KM..... 0
PASS  BASE     TEST     DIFF    %      PASS  BASE     TEST     DIFF    %      PASS  BASE     TEST     DIFF    %
-------------------------------------  -------------------------------------  -------------------------------------
  1   1.190    0.850    0.340-  29-     51   0.047    0.033    0.013-  29-    101   0.035    0.025    0.010-  29-
  2   0.595    0.425    0.170-  29-     52   0.046    0.033    0.013-  29-    102   0.035    0.025    0.010-  29-
  3   0.397    0.283    0.113-  29-     53   0.045    0.032    0.013-  29-    103   0.035    0.025    0.010-  29-
  4   0.297    0.213    0.085-  29-     54   0.044    0.031    0.013-  29-    104   0.034    0.025    0.010-  29-
  5   0.238    0.170    0.068-  29-     55   0.043    0.031    0.012-  29-    105   0.034    0.024    0.010-  29-
  6   0.198    0.142    0.057-  29-     56   0.043    0.030    0.012-  29-    106   0.034    0.024    0.010-  29-
  7   0.170    0.121    0.049-  29-     57   0.042    0.030    0.012-  29-    107   0.033    0.024    0.010-  29-
  8   0.149    0.106    0.042-  29-     58   0.041    0.029    0.012-  29-    108   0.033    0.024    0.009-  29-
  9   0.132    0.094    0.038-  29-     59   0.040    0.029    0.012-  29-    109   0.033    0.023    0.009-  29-
 10   0.119    0.085    0.034-  29-     60   0.040    0.028    0.011-  29-    110   0.032    0.023    0.009-  29-
 11   0.108    0.077    0.031-  29-     61   0.039    0.028    0.011-  29-    111   0.032    0.023    0.009-  29-
 12   0.099    0.071    0.028-  29-     62   0.038    0.027    0.011-  29-    112   0.032    0.023    0.009-  29-
 13   0.092    0.065    0.026-  29-     63   0.038    0.027    0.011-  29-    113   0.032    0.023    0.009-  29-
 14   0.085    0.061    0.024-  29-     64   0.037    0.027    0.011-  29-    114   0.031    0.022    0.009-  29-
 15   0.079    0.057    0.023-  29-     65   0.037    0.026    0.010-  29-    115   0.031    0.022    0.009-  29-
 16   0.074    0.053    0.021-  29-     66   0.036    0.026    0.010-  29-    116   0.031    0.022    0.009-  29-
 17   0.070    0.050    0.020-  29-     67   0.036    0.025    0.010-  29-    117   0.031    0.022    0.009-  29-
 18   0.066    0.047    0.019-  29-     68   0.035    0.025    0.010-  29-    118   0.030    0.022    0.009-  29-
 19   0.063    0.045    0.018-  29-     69   0.034    0.025    0.010-  29-    119   0.030    0.021    0.009-  29-
 20   0.059    0.043    0.017-  29-     70   0.034    0.024    0.010-  29-    120   0.030    0.021    0.009-  29-
 21   0.057    0.040    0.016-  29-     71   0.034    0.024    0.010-  29-    121   0.030    0.021    0.008-  29-
 22   0.054    0.039    0.015-  29-     72   0.033    0.024    0.009-  29-    122   0.029    0.021    0.008-  29-
 23   0.052    0.037    0.015-  29-     73   0.033    0.023    0.009-  29-    123   0.029    0.021    0.008-  29-
 24   0.050    0.035    0.014-  29-     74   0.032    0.023    0.009-  29-    124   0.029    0.021    0.008-  29-
 25   0.048    0.034    0.014-  29-     75   0.032    0.023    0.009-  29-    125   0.029    0.020    0.008-  29-
 26   0.046    0.033    0.013-  29-     76   0.031    0.022    0.009-  29-    126   0.028    0.020    0.008-  29-
 27   0.044    0.031    0.013-  29-     77   0.031    0.022    0.009-  29-    127   0.028    0.020    0.008-  29-
 28   0.042    0.030    0.012-  29-     78   0.031    0.022    0.009-  29-    128   0.028    0.020    0.008-  29-
 29   0.041    0.029    0.012-  29-     79   0.030    0.022    0.009-  29-    129   0.028    0.020    0.008-  29-
 30   0.040    0.028    0.011-  29-     80   0.030    0.021    0.009-  29-    130   0.037    0.020    0.017-  46-
 31   0.038    0.027    0.011-  29-     81   0.029    0.021    0.008-  29-    131   0.036    0.019    0.017-  46-
 32   0.037    0.027    0.011-  29-     82   0.029    0.021    0.008-  29-    132   0.036    0.019    0.017-  46-
 33   0.036    0.026    0.010-  29-     83   0.029    0.020    0.008-  29-    133   0.036    0.019    0.017-  46-
 34   0.035    0.025    0.010-  29-     84   0.028    0.020    0.008-  29-    134   0.036    0.019    0.016-  46-
 35   0.034    0.024    0.010-  29-     85   0.028    0.020    0.008-  29-    135   0.035    0.019    0.016-  46-
 36   0.033    0.024    0.009-  29-     86   0.028    0.020    0.008-  29-    136   0.035    0.019    0.016-  46-
 37   0.032    0.023    0.009-  29-     87   0.041    0.020    0.021-  52-    137   0.035    0.019    0.016-  46-
 38   0.031    0.022    0.009-  29-     88   0.041    0.019    0.021-  52-    138   0.034    0.018    0.016-  46-
 39   0.031    0.022    0.009-  29-     89   0.040    0.019    0.021-  52-    139   0.034    0.018    0.016-  46-
 40   0.030    0.021    0.008-  29-     90   0.040    0.019    0.021-  52-    140   0.034    0.018    0.016-  46-
 41   0.029    0.021    0.008-  29-     91   0.039    0.019    0.021-  52-    141   0.034    0.018    0.016-  46-
 42   0.028    0.020    0.008-  29-     92   0.039    0.018    0.020-  52-    142   0.034    0.024    0.010-  29-
 43   0.028    0.020    0.008-  29-     93   0.038    0.018    0.020-  52-    143   0.033    0.024    0.010-  29-
 44   0.054    0.019    0.035-  64-     94   0.038    0.018    0.020-  52-    144   0.033    0.024    0.009-  29-
 45   0.053    0.019    0.034-  64-     95   0.038    0.027    0.011-  29-    145   0.033    0.023    0.009-  29-
 46   0.052    0.018    0.033-  64-     96   0.037    0.027    0.011-  29-    146   0.033    0.023    0.009-  29-
 47   0.051    0.018    0.033-  64-     97   0.037    0.026    0.011-  29-    147   0.032    0.023    0.009-  29-
 48   0.050    0.035    0.014-  29-     98   0.036    0.026    0.010-  29-    148   0.032    0.023    0.009-  29-
 49   0.049    0.035    0.014-  29-     99   0.036    0.026    0.010-  29-    149   0.032    0.023    0.009-  29-
 50   0.048    0.034    0.014-  29-    100   0.036    0.026    0.010-  29-    150   0.032    0.023    0.009-  29-
-------------------------------------  -------------------------------------  -------------------------------------
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    BUS COST ESTIMATING MODEL

BASELINE BUS
U  T SEATING CAPACITY.... 43        BUS $/KM......... .59
D  VER $/KM............ .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR BASELINE HI-LO COST COMPARISON
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .35
D  VER $/KM............ .5        OVERHEAD $/KM..... 0
PASS  BASE      TEST      DIFF    %       PASS  BASE      TEST      DIFF    %       PASS  BASE      TEST      DIFF    %
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      1.190     0.850     0.340-  29-      51   0.047     0.033     0.013-  29-      101  0.035     0.025     0.010-  29-
      0.595     0.425     0.170-  29-      52   0.046     0.033     0.013-  29-      102  0.035     0.025     0.010-  29-
  3   0.397     0.283     0.113-  29-      53   0.045     0.032     0.013-  29-      103  0.035     0.025     0.010-  29-
      0.297     0.213     0.085-  29-      54   0.044     0.031     0.013-  29-      104  0.034     0.025     0.010-  29-
      0.238     0.170     0.068-  29-      55   0.043     0.031     0.012-  29-      105  0.034     0.024     0.010-  29-
  6   0.198     0.142     0.057-  29-      56   0.043     0.030     0.012-  29-      106  0.034     0.024     0.010-  29-
  7   0.170     0.121     0.049-  29-      57   0.042     0.030     0.012-  29-      107  0.033     0.024     0.010-  29-
      0.149     0.106     0.042-  29-      58   0.041     0.029     0.012-  29-      108  0.033     0.024     0.009-  29-
      0.132     0.094     0.038-  29-      59   0.040     0.029     0.012-  29-      109  0.033     0.023     0.009-  29-
 10   0.119     0.085     0.034-  29-      60   0.040     0.028     0.011-  29-      110  0.032     0.023     0.009-  29-
      0.108     0.077     0.031-  29-      61   0.039     0.028     0.011-  29-      111  0.032     0.023     0.009-  29-
      0.099     0.071     0.028-  29-      62   0.038     0.027     0.011-  29-      112  0.032     0.023     0.009-  29-
 13   0.092     0.065     0.026-  29-      63   0.038     0.027     0.011-  29-      113  0.032     0.023     0.009-  29-
 14   0.085     0.061     0.024-  29-      64   0.037     0.027     0.011-  29-      114  0.031     0.022     0.009-  29-
      0.079     0.057     0.023-  29-      65   0.037     0.026     0.010-  29-      115  0.031     0.022     0.009-  29-
      0.074     0.053     0.021-  29-      66   0.036     0.026     0.010-  29-      116  0.031     0.022     0.009-  29-
 17   0.070     0.050     0.020-  29-      67   0.036     0.025     0.010-  29-      117  0.031     0.022     0.009-  29-
      0.066     0.047     0.019-  29-      68   0.035     0.025     0.010-  29-      118  0.030     0.022     0.009-  29-
      0.063     0.045     0.018-  29-      69   0.034     0.025     0.010-  29-      119  0.030     0.021     0.009-  29-
 20   0.059     0.043     0.017-  29-      70   0.034     0.024     0.010-  29-      120  0.030     0.021     0.009-  29-
      0.057     0.040     0.016-  29-      71   0.034     0.024     0.010-  29-      121  0.030     0.021     0.008-  29-
      0.054     0.039     0.015-  29-      72   0.033     0.024     0.009-  29-      122  0.029     0.021     0.008-  29-
 23   0.052     0.037     0.015-  29-      73   0.033     0.023     0.009-  29-      123  0.029     0.021     0.008-  29-
 24   0.050     0.035     0.014-  29-      74   0.032     0.023     0.009-  29-      124  0.029     0.021     0.008-  29-
      0.048     0.034     0.014-  29-      75   0.032     0.023     0.009-  29-      125  0.029     0.020     0.008-  29-
      0.046     0.033     0.013-  29-      76   0.031     0.022     0.009-  29-      126  0.028     0.020     0.008-  29-
 27   0.044     0.031     0.013-  29-      77   0.031     0.022     0.009-  29-      127  0.028     0.020     0.008-  29-
      0.042     0.030     0.012-  29-      78   0.031     0.022     0.009-  29-      128  0.028     0.020     0.008-  29-
      0.041     0.029     0.012-  29-      79   0.030     0.022     0.009-  29-      129  0.028     0.020     0.008-  29-
 30   0.040     0.028     0.011-  29-      80   0.030     0.021     0.009-  29-      130  0.037     0.020     0.017-  46-
      0.038     0.027     0.011-  29-      81   0.029     0.021     0.008-  29-      131  0.036     0.019     0.017-  46-
      0.037     0.027     0.011-  29-      82   0.029     0.021     0.008-  29-      132  0.036     0.019     0.017-  46-
 33   0.036     0.026     0.010-  29-      83   0.029     0.020     0.008-  29-      133  0.036     0.019     0.017-  46-
 34   0.035     0.025     0.010-  29-      84   0.028     0.020     0.008-  29-      134  0.036     0.019     0.016-  46-
      0.034     0.024     0.010-  29-      85   0.028     0.020     0.008-  29-      135  0.035     0.019     0.016-  46-
      0.033     0.024     0.009-  29-      86   0.028     0.020     0.008-  29-      136  0.035     0.019     0.016-  46-
 37   0.032     0.023     0.009-  29-      87   0.041     0.020     0.021-  52-      137  0.035     0.019     0.016-  46-
      0.031     0.022     0.009-  29-      88   0.041     0.019     0.021-  52-      138  0.034     0.018     0.016-  46-
      0.031     0.022     0.009-  29-      89   0.040     0.019     0.021-  52-      139  0.034     0.018     0.016-  46-
 40   0.030     0.021     0.008-  29-      90   0.040     0.019     0.021-  52-      140  0.034     0.018     0.016-  46-
      0.029     0.021     0.008-  29-      91   0.039     0.019     0.021-  52-      141  0.034     0.018     0.016-  46-
      0.028     0.020     0.008-  29-      92   0.039     0.018     0.020-  52-      142  0.034     0.024     0.010-  29-
      0.028     0.020     0.008-  29-      93   0.038     0.018     0.020-  52-      143  0.033     0.024     0.010-  29-
 44   0.054     0.019     0.035-  64-      94   0.038     0.018     0.020-  52-      144  0.033     0.024     0.009-  29-
      0.053     0.019     0.034-  64-      95   0.038     0.027     0.011-  29-      145  0.033     0.023     0.009-  29-
      0.052     0.018     0.033-  64-      96   0.037     0.027     0.011-  29-      146  0.033     0.023     0.009-  29-
  7   0.051     0.018     0.033-  64-      97   0.037     0.026     0.011-  29-      147  0.032     0.023     0.009-  29-
      0.050     0.035     0.014-  29-      98   0.036     0.026     0.010-  29-      148  0.032     0.023     0.009-  29-
      0.049     0.035     0.014-  29-      99   0.036     0.026     0.010-  29-      149  0.032     0.023     0.009-  29-
  0   0.048     0.034     0.014-  29-      100  0.036     0.026     0.010-  29-      150  0.032     0.023     0.009-  29-
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BIG BUS COST ESTIMATING MODEL

 BASELINE BUS
 UNIT SEATING CAPACITY.... 43         BUS $/KM......... .74
 DRIVER $/KM............. .36        OVERHEAD $/KM..... 0
 SCENARIO SMALL OPERATOR BASELINE HI-LO COST COMPARISON
 UNIT SEATING CAPACITY.... 47         BUS $/KM......... .4
 DRIVER $/KM............. .24        OVERHEAD $/KM..... 0
PASS  BASE     TEST     DIFF    %      PASS  BASE     TEST     DIFF    %      PASS  BASE     TEST     DIFF    %
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  1   1.100    0.640    0.460-  42-     51   0.043    0.025    0.018-  42-     101   0.033    0.019    0.014-  42-
  2   0.550    0.320    0.230-  42-     52   0.042    0.025    0.018-  42-     102   0.032    0.019    0.014-  42-
  3   0.367    0.213    0.153-  42-     53   0.042    0.024    0.017-  42-     103   0.032    0.019    0.013-  42-
  4   0.275    0.160    0.115-  42-     54   0.041    0.024    0.017-  42-     104   0.032    0.018    0.013-  42-
  5   0.220    0.128    0.092-  42-     55   0.040    0.023    0.017-  42-     105   0.031    0.018    0.013-  42-
  6   0.183    0.107    0.077-  42-     56   0.039    0.023    0.016-  42-     106   0.031    0.018    0.013-  42-
  7   0.157    0.091    0.066-  42-     57   0.039    0.022    0.016-  42-     107   0.031    0.018    0.013-  42-
  8   0.138    0.080    0.058-  42-     58   0.038    0.022    0.016-  42-     108   0.031    0.018    0.013-  42-
  9   0.122    0.071    0.051-  42-     59   0.037    0.022    0.016-  42-     109   0.030    0.018    0.013-  42-
 10   0.110    0.064    0.046-  42-     60   0.037    0.021    0.015-  42-     110   0.030    0.017    0.013-  42-
 11   0.100    0.058    0.042-  42-     61   0.036    0.021    0.015-  42-     111   0.030    0.017    0.012-  42-
 12   0.092    0.053    0.038-  42-     62   0.035    0.021    0.015-  42-     112   0.029    0.017    0.012-  42-
 13   0.085    0.049    0.035-  42-     63   0.035    0.020    0.015-  42-     113   0.029    0.017    0.012-  42-
 14   0.079    0.046    0.033-  42-     64   0.034    0.020    0.014-  42-     114   0.029    0.017    0.012-  42-
 15   0.073    0.043    0.031-  42-     65   0.034    0.020    0.014-  42-     115   0.029    0.017    0.012-  42-
 16   0.069    0.040    0.029-  42-     66   0.033    0.019    0.014-  42-     116   0.028    0.017    0.012-  42-
 17   0.065    0.038    0.027-  42-     67   0.033    0.019    0.014-  42-     117   0.028    0.016    0.012-  42-
 18   0.061    0.036    0.026-  42-     68   0.032    0.019    0.014-  42-     118   0.028    0.016    0.012-  42-
 19   0.058    0.034    0.024-  42-     69   0.032    0.019    0.013-  42-     119   0.028    0.016    0.012-  42-
 20   0.055    0.032    0.023-  42-     70   0.031    0.018    0.013-  42-     120   0.027    0.016    0.012-  42-
 21   0.052    0.030    0.022-  42-     71   0.031    0.018    0.013-  42-     121   0.027    0.016    0.011-  42-
 22   0.050    0.029    0.021-  42-     72   0.031    0.018    0.013-  42-     122   0.027    0.016    0.011-  42-
 23   0.048    0.028    0.020-  42-     73   0.030    0.018    0.013-  42-     123   0.027    0.016    0.011-  42-
 24   0.046    0.027    0.019-  42-     74   0.030    0.017    0.012-  42-     124   0.027    0.015    0.011-  42-
 25   0.044    0.026    0.018-  42-     75   0.029    0.017    0.012-  42-     125   0.026    0.015    0.011-  42-
 26   0.042    0.025    0.018-  42-     76   0.029    0.017    0.012-  42-     126   0.026    0.015    0.011-  42-
 27   0.041    0.024    0.017-  42-     77   0.029    0.017    0.012-  42-     127   0.026    0.015    0.011-  42-
 28   0.039    0.023    0.016-  42-     78   0.028    0.016    0.012-  42-     128   0.026    0.015    0.011-  42-
 29   0.038    0.022    0.016-  42-     79   0.028    0.016    0.012-  42-     129   0.026    0.015    0.011-  42-
 30   0.037    0.021    0.015-  42-     80   0.027    0.016    0.012-  42-     130   0.034    0.015    0.019-  56-
 31   0.035    0.021    0.015-  42-     81   0.027    0.016    0.011-  42-     131   0.034    0.015    0.019-  56-
 32   0.034    0.020    0.014-  42-     82   0.027    0.016    0.011-  42-     132   0.033    0.015    0.019-  56-
 33   0.033    0.019    0.014-  42-     83   0.027    0.015    0.011-  42-     133   0.033    0.014    0.019-  56-
 34   0.032    0.019    0.014-  42-     84   0.026    0.015    0.011-  42-     134   0.033    0.014    0.019-  56-
 35   0.031    0.018    0.013-  42-     85   0.026    0.015    0.011-  42-     135   0.033    0.014    0.018-  56-
 36   0.031    0.018    0.013-  42-     86   0.026    0.015    0.011-  42-     136   0.032    0.014    0.018-  56-
 37   0.030    0.017    0.012-  42-     87   0.038    0.015    0.023-  61-     137   0.032    0.014    0.018-  56-
 38   0.029    0.017    0.012-  42-     88   0.037    0.015    0.023-  61-     138   0.032    0.014    0.018-  56-
 39   0.028    0.016    0.012-  42-     89   0.037    0.014    0.023-  61-     139   0.032    0.014    0.018-  56-
 40   0.028    0.016    0.012-  42-     90   0.037    0.014    0.022-  61-     140   0.031    0.014    0.018-  56-
 41   0.027    0.016    0.011-  42-     91   0.036    0.014    0.022-  61-     141   0.031    0.014    0.018-  56-
 42   0.026    0.015    0.011-  42-     92   0.036    0.014    0.022-  61-     142   0.031    0.018    0.013-  42-
 43   0.026    0.015    0.011-  42-     93   0.035    0.014    0.022-  61-     143   0.031    0.018    0.013-  42-
 44   0.050    0.015    0.035-  71-     94   0.035    0.014    0.021-  61-     144   0.031    0.018    0.013-  42-
 45   0.049    0.014    0.035-  71-     95   0.035    0.020    0.015-  42-     145   0.030    0.018    0.013-  42-
 46   0.048    0.014    0.034-  71-     96   0.034    0.020    0.014-  42-     146   0.030    0.018    0.013-  42-
 47   0.047    0.014    0.033-  71-     97   0.034    0.020    0.014-  42-     147   0.030    0.017    0.013-  42-
 48   0.046    0.027    0.019-  42-     98   0.034    0.020    0.014-  42-     148   0.030    0.017    0.012-  42-
 49   0.045    0.026    0.019-  42-     99   0.033    0.019    0.014-  42-     149   0.030    0.017    0.012-  42-
 50   0.044    0.026    0.018-  42-    100   0.033    0.019    0.014-  42-     150   0.029    0.017    0.012-  42-
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IG BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM.......... .59
RIVER $/KM............. .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR-HIGH END-$250000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
ST BUS $/KM................ .71    2ND BUS $/KM................. .59
ST DRIVER $/KM............. .6    2ND DRIVER $/KM............. .6
OVERHEAD $/KM............... 0

 SS   BASE     TEST     DIFF     %        PASS  BASE     TEST     DIFF     %        PASS  BASE     TEST     DIFF     %
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  1   1.190    1.310    0.120    10         51  0.047    0.026    0.021-   45-       101  0.035    0.025    0.011-   30-
  2   0.595    0.655    0.060    10         52  0.046    0.025    0.021-   45-       102  0.035    0.025    0.010-   30-
  3   0.397    0.437    0.040    10         53  0.045    0.025    0.020-   45-       103  0.035    0.024    0.010-   30-
  4   0.297    0.328    0.030    10         54  0.044    0.024    0.020-   45-       104  0.034    0.024    0.010-   30-
  5   0.238    0.262    0.024    10         55  0.043    0.024    0.019-   45-       105  0.034    0.035    0.001     3
  6   0.198    0.218    0.020    10         56  0.043    0.023    0.019-   45-       106  0.034    0.035    0.001     3
  7   0.170    0.187    0.017    10         57  0.042    0.023    0.019-   45-       107  0.033    0.034    0.001     3
  8   0.149    0.164    0.015    10         58  0.041    0.023    0.018-   45-       108  0.033    0.034    0.001     3
  9   0.132    0.146    0.013    10         59  0.040    0.022    0.018-   45-       109  0.033    0.034    0.001     3
 10   0.119    0.131    0.012    10         60  0.040    0.022    0.018-   45-       110  0.032    0.034    0.001     3
 11   0.108    0.119    0.011    10         61  0.039    0.021    0.018-   45-       111  0.032    0.033    0.001     3
 12   0.099    0.109    0.010    10         62  0.038    0.040    0.002     5        112  0.032    0.033    0.001     3
 13   0.092    0.101    0.009    10         63  0.038    0.040    0.002     5        113  0.032    0.033    0.001     3
 14   0.085    0.094    0.009    10         64  0.037    0.039    0.002     5        114  0.031    0.032    0.001     3
 15   0.079    0.087    0.008    10         65  0.037    0.038    0.002     5        115  0.031    0.032    0.001     3
 16   0.074    0.082    0.008    10         66  0.036    0.038    0.002     5        116  0.031    0.032    0.001     3
 17   0.070    0.077    0.007    10         67  0.036    0.037    0.002     5        117  0.031    0.032    0.001     3
 18   0.066    0.073    0.007    10         68  0.035    0.037    0.002     5        118  0.030    0.031    0.001     3
 19   0.063    0.069    0.006    10         69  0.034    0.036    0.002     5        119  0.030    0.031    0.001     3
 20   0.059    0.066    0.006    10         70  0.034    0.036    0.002     5        120  0.030    0.031    0.001     3
 21   0.057    0.062    0.006    10         71  0.034    0.035    0.002     5        121  0.030    0.030    0.001     3
 22   0.054    0.060    0.005    10         72  0.033    0.035    0.002     5        122  0.029    0.030    0.001     3
 23   0.052    0.057    0.005    10         73  0.033    0.034    0.002     5        123  0.029    0.030    0.001     3
 24   0.050    0.055    0.005    10         74  0.032    0.034    0.002     5        124  0.029    0.030    0.001     3
 25   0.048    0.052    0.005    10         75  0.032    0.033    0.002     5        125  0.029    0.030    0.001     3
 26   0.046    0.050    0.005    10         76  0.031    0.033    0.002     5        126  0.028    0.029    0.001     3
 27   0.044    0.049    0.004    10         77  0.031    0.032    0.002     5        127  0.028    0.029    0.001     3
 28   0.042    0.047    0.004    10         78  0.031    0.032    0.002     5        128  0.028    0.029    0.001     3
 29   0.041    0.045    0.004    10         79  0.030    0.032    0.002     5        129  0.028    0.029    0.001     3
 30   0.040    0.044    0.004    10         80  0.030    0.031    0.002     5        130  0.037    0.028    0.008-   22-
 31   0.038    0.042    0.004    10         81  0.029    0.031    0.001     5        131  0.036    0.028    0.008-   22-
 32   0.037    0.041    0.004    10         82  0.029    0.030    0.001     5        132  0.036    0.028    0.008-   22-
 33   0.036    0.040    0.004    10         83  0.029    0.030    0.001     5        133  0.036    0.028    0.008-   22-
 34   0.035    0.039    0.004    10         84  0.028    0.030    0.001     5        134  0.036    0.028    0.008-   22-
 35   0.034    0.037    0.003    10         85  0.028    0.029    0.001     5        135  0.035    0.027    0.008-   22-
 36   0.033    0.036    0.003    10         86  0.028    0.029    0.001     5        136  0.035    0.027    0.008-   22-
 37   0.032    0.035    0.003    10         87  0.041    0.029    0.012-   30-       137  0.035    0.027    0.008-   22-
 38   0.031    0.034    0.003    10         88  0.041    0.028    0.012-   30-       138  0.034    0.027    0.008-   22-
 39   0.031    0.034    0.003    10         89  0.040    0.028    0.012-   30-       139  0.034    0.027    0.008-   22-
 40   0.030    0.033    0.003    10         90  0.040    0.028    0.012-   30-       140  0.034    0.026    0.008-   22-
 41   0.029    0.032    0.003    10         91  0.039    0.027    0.012-   30-       141  0.034    0.026    0.008-   22-
 42   0.028    0.031    0.003    10         92  0.039    0.027    0.012-   30-       142  0.034    0.026    0.008-   22-
 43   0.028    0.030    0.003    10         93  0.038    0.027    0.012-   30-       143  0.033    0.026    0.007-   22-
 44   0.054    0.030    0.024-   45-        94  0.038    0.027    0.011-   30-       144  0.033    0.026    0.007-   22-
 45   0.053    0.029    0.024-   45-        95  0.038    0.026    0.011-   30-       145  0.033    0.025    0.007-   22-
 46   0.052    0.028    0.023-   45-        96  0.037    0.026    0.011-   30-       146  0.033    0.025    0.007-   22-
 47   0.051    0.028    0.023-   45-        97  0.037    0.026    0.011-   30-       147  0.032    0.025    0.007-   22-
 48   0.050    0.027    0.022-   45-        98  0.036    0.026    0.011-   30-       148  0.032    0.033    0.001     3
 49   0.049    0.027    0.022-   45-        99  0.036    0.025    0.011-   30-       149  0.032    0.033    0.001     3
 50   0.048    0.026    0.021-   45-       100  0.036    0.025    0.011-   30-       150  0.032    0.033    0.001     3
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BIG BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM.......... .59
DRIVER $/KM............. .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR-HIGH END-$350000
1ST UNIT SEATING CAPACITY.... 61   2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM................ .81   2ND BUS $/KM................. .59
1ST DRIVER $/KM............. .6   2ND DRIVER $/KM............. .6
OVERHEAD $/KM............... 0

PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %
---------------------------------    ----------------------------------    ----------------------------------
  1  1.190   1.410   0.220   18       51  0.047   0.028   0.019-  41-     101  0.035   0.026   0.010-  27-
  2  0.595   0.705   0.110   18       52  0.046   0.027   0.019-  41-     102  0.035   0.025   0.010-  27-
  3  0.397   0.470   0.073   18       53  0.045   0.027   0.018-  41-     103  0.035   0.025   0.009-  27-
  4  0.297   0.352   0.055   18       54  0.044   0.026   0.018-  41-     104  0.034   0.025   0.009-  27-
  5  0.238   0.282   0.044   18       55  0.043   0.026   0.018-  41-     105  0.034   0.036   0.002    6
  6  0.198   0.235   0.037   18       56  0.043   0.025   0.017-  41-     106  0.034   0.036   0.002    6
  7  0.170   0.201   0.031   18       57  0.042   0.025   0.017-  41-     107  0.033   0.035   0.002    6
  8  0.149   0.176   0.028   18       58  0.041   0.024   0.017-  41-     108  0.033   0.035   0.002    6
  9  0.132   0.157   0.024   18       59  0.040   0.024   0.016-  41-     109  0.033   0.035   0.002    6
 10  0.119   0.141   0.022   18       60  0.040   0.023   0.016-  41-     110  0.032   0.034   0.002    6
 11  0.108   0.128   0.020   18       61  0.039   0.023   0.016-  41-     111  0.032   0.034   0.002    6
 12  0.099   0.118   0.018   18       62  0.038   0.042   0.004    9      112  0.032   0.034   0.002    6
 13  0.092   0.108   0.017   18       63  0.038   0.041   0.003    9      113  0.032   0.034   0.002    6
 14  0.085   0.101   0.016   18       64  0.037   0.041   0.003    9      114  0.031   0.033   0.002    6
 15  0.079   0.094   0.015   18       65  0.037   0.040   0.003    9      115  0.031   0.033   0.002    6
 16  0.074   0.088   0.014   18       66  0.036   0.039   0.003    9      116  0.031   0.033   0.002    6
 17  0.070   0.083   0.013   18       67  0.036   0.039   0.003    9      117  0.031   0.032   0.002    6
 18  0.066   0.078   0.012   18       68  0.035   0.038   0.003    9      118  0.030   0.032   0.002    6
 19  0.063   0.074   0.012   18       69  0.034   0.038   0.003    9      119  0.030   0.032   0.002    6
 20  0.059   0.071   0.011   18       70  0.034   0.037   0.003    9      120  0.030   0.032   0.002    6
 21  0.057   0.067   0.010   18       71  0.034   0.037   0.003    9      121  0.030   0.031   0.002    6
 22  0.054   0.064   0.010   18       72  0.033   0.036   0.003    9      122  0.029   0.031   0.002    6
 23  0.052   0.061   0.010   18       73  0.033   0.036   0.003    9      123  0.029   0.031   0.002    6
 24  0.050   0.059   0.009   18       74  0.032   0.035   0.003    9      124  0.029   0.031   0.002    6
 25  0.048   0.056   0.009   18       75  0.032   0.035   0.003    9      125  0.029   0.030   0.002    6
 26  0.046   0.054   0.008   18       76  0.031   0.034   0.003    9      126  0.028   0.030   0.002    6
 27  0.044   0.052   0.008   18       77  0.031   0.034   0.003    9      127  0.028   0.030   0.002    6
 28  0.042   0.050   0.008   18       78  0.031   0.033   0.003    9      128  0.028   0.030   0.002    6
 29  0.041   0.049   0.008   18       79  0.030   0.033   0.003    9      129  0.028   0.029   0.002    6
 30  0.040   0.047   0.007   18       80  0.030   0.033   0.003    9      130  0.037   0.029   0.007-  20-
 31  0.038   0.045   0.007   18       81  0.029   0.032   0.003    9      131  0.036   0.029   0.007-  20-
 32  0.037   0.044   0.007   18       82  0.029   0.032   0.003    9      132  0.036   0.029   0.007-  20-
 33  0.036   0.043   0.007   18       83  0.029   0.031   0.003    9      133  0.036   0.028   0.007-  20-
 34  0.035   0.041   0.006   18       84  0.028   0.031   0.003    9      134  0.036   0.028   0.007-  20-
 35  0.034   0.040   0.006   18       85  0.028   0.031   0.003    9      135  0.035   0.028   0.007-  20-
 36  0.033   0.039   0.006   18       86  0.028   0.030   0.003    9      136  0.035   0.028   0.007-  20-
 37  0.032   0.038   0.006   18       87  0.041   0.030   0.011-  27-     137  0.035   0.028   0.007-  20-
 38  0.031   0.037   0.006   18       88  0.041   0.030   0.011-  27-     138  0.034   0.027   0.007-  20-
 39  0.031   0.036   0.006   18       89  0.040   0.029   0.011-  27-     139  0.034   0.027   0.007-  20-
 40  0.030   0.035   0.006   18       90  0.040   0.029   0.011-  27-     140  0.034   0.027   0.007-  20-
 41  0.029   0.034   0.005   18       91  0.039   0.029   0.011-  27-     141  0.034   0.027   0.007-  20-
 42  0.028   0.034   0.005   18       92  0.039   0.028   0.011-  27-     142  0.034   0.027   0.007-  20-
 43  0.028   0.033   0.005   18       93  0.038   0.028   0.010-  27-     143  0.033   0.027   0.007-  20-
 44  0.054   0.032   0.022-  41-      94  0.038   0.028   0.010-  27-     144  0.033   0.026   0.007-  20-
 45  0.053   0.031   0.022-  41-      95  0.038   0.027   0.010-  27-     145  0.033   0.026   0.007-  20-
 46  0.052   0.031   0.021-  41-      96  0.037   0.027   0.010-  27-     146  0.033   0.026   0.007-  20-
 47  0.051   0.030   0.021-  41-      97  0.037   0.027   0.010-  27-     147  0.032   0.026   0.007-  20-
 48  0.050   0.029   0.020-  41-      98  0.036   0.027   0.010-  27-     148  0.032   0.034   0.001    5
 49  0.049   0.029   0.020-  41-      99  0.036   0.026   0.010-  27-     149  0.032   0.033   0.001    5
 50  0.048   0.028   0.019-  41-     100  0.036   0.026   0.010-  27-     150  0.032   0.033   0.001    5
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IG BUS COST ESTIMATING MODEL

BASELINE BUS
NIT SEATING CAPACITY.... 47          BUS $/KM......... .35
RIVER $/KM............ .5           OVERHEAD $/KM..... 0
SCENARIO #1LARGE OPERATOR-LOW END-$250000
ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
ST BUS $/KM................ .44   2ND BUS $/KM................ .35
ST DRIVER $/KM............ .5   2ND DRIVER $/KM............ .5
OVERHEAD $/KM.............. 0

ASS   BASE     TEST     DIFF     %        PASS  BASE     TEST     DIFF     %        PASS  BASE     TEST     DIFF     %
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  1   0.850    0.940    0.090    11         51   0.033    0.018    0.015-   45-       101   0.025    0.018    0.008-   30-
  2   0.425    0.470    0.045    11         52   0.033    0.018    0.015-   45-       102   0.025    0.018    0.007-   30-
  3   0.283    0.313    0.030    11         53   0.032    0.018    0.014-   45-       103   0.025    0.017    0.007-   30-
  4   0.213    0.235    0.022    11         54   0.031    0.017    0.014-   45-       104   0.025    0.017    0.007-   30-
  5   0.170    0.188    0.018    11         55   0.031    0.017    0.014-   45-       105   0.024    0.017    0.007-   30-
  6   0.142    0.157    0.015    11         56   0.030    0.017    0.014-   45-       106   0.024    0.017    0.007-   30-
  7   0.121    0.134    0.013    11         57   0.030    0.016    0.013-   45-       107   0.024    0.017    0.007-   30-
  8   0.106    0.118    0.011    11         58   0.029    0.016    0.013-   45-       108   0.024    0.017    0.007-   30-
  9   0.094    0.104    0.010    11         59   0.029    0.016    0.013-   45-       109   0.023    0.016    0.007-   30-
 10   0.085    0.094    0.009    11         60   0.028    0.016    0.013-   45-       110   0.023    0.016    0.007-   30-
 11   0.077    0.085    0.008    11         61   0.028    0.015    0.012-   45-       111   0.023    0.016    0.007-   30-
 12   0.071    0.078    0.007    11         62   0.027    0.015    0.012-   45-       112   0.023    0.016    0.007-   30-
 13   0.065    0.072    0.007    11         63   0.027    0.015    0.012-   45-       113   0.023    0.016    0.007-   30-
 14   0.061    0.067    0.006    11         64   0.027    0.015    0.012-   45-       114   0.022    0.016    0.007-   30-
 15   0.057    0.063    0.006    11         65   0.026    0.014    0.012-   45-       115   0.022    0.016    0.007-   30-
 16   0.053    0.059    0.006    11         66   0.026    0.014    0.012-   45-       116   0.022    0.015    0.007-   30-
 17   0.050    0.055    0.005    11         67   0.025    0.014    0.011-   45-       117   0.022    0.015    0.006-   30-
 18   0.047    0.052    0.005    11         68   0.025    0.014    0.011-   45-       118   0.022    0.015    0.006-   30-
 19   0.045    0.049    0.005    11         69   0.025    0.014    0.011-   45-       119   0.021    0.015    0.006-   30-
 20   0.043    0.047    0.004    11         70   0.024    0.013    0.011-   45-       120   0.021    0.022    0.001     4
 21   0.040    0.045    0.004    11         71   0.024    0.013    0.011-   45-       121   0.021    0.022    0.001     4
 22   0.039    0.043    0.004    11         72   0.024    0.013    0.011-   45-       122   0.021    0.022    0.001     4
 23   0.037    0.041    0.004    11         73   0.023    0.025    0.001     5        123   0.021    0.021    0.001     4
 24   0.035    0.039    0.004    11         74   0.023    0.024    0.001     5        124   0.021    0.021    0.001     4
 25   0.034    0.038    0.004    11         75   0.023    0.024    0.001     5        125   0.020    0.021    0.001     4
 26   0.033    0.036    0.003    11         76   0.022    0.024    0.001     5        126   0.020    0.021    0.001     4
 27   0.031    0.035    0.003    11         77   0.022    0.023    0.001     5        127   0.020    0.021    0.001     4
 28   0.030    0.034    0.003    11         78   0.022    0.023    0.001     5        128   0.020    0.021    0.001     4
 29   0.029    0.032    0.003    11         79   0.022    0.023    0.001     5        129   0.020    0.020    0.001     4
 30   0.028    0.031    0.003    11         80   0.021    0.022    0.001     5        130   0.020    0.020    0.001     4
 31   0.027    0.030    0.003    11         81   0.021    0.022    0.001     5        131   0.019    0.020    0.001     4
 32   0.027    0.029    0.003    11         82   0.021    0.022    0.001     5        132   0.019    0.020    0.001     4
 33   0.026    0.028    0.003    11         83   0.020    0.022    0.001     5        133   0.019    0.020    0.001     4
 34   0.025    0.028    0.003    11         84   0.020    0.021    0.001     5        134   0.019    0.020    0.001     4
 35   0.024    0.027    0.003    11         85   0.020    0.021    0.001     5        135   0.019    0.020    0.001     4
 36   0.024    0.026    0.002    11         86   0.020    0.021    0.001     5        136   0.019    0.019    0.001     4
 37   0.023    0.025    0.002    11         87   0.020    0.021    0.001     5        137   0.019    0.019    0.001     4
 38   0.022    0.025    0.002    11         88   0.019    0.020    0.001     5        138   0.018    0.019    0.001     4
 39   0.022    0.024    0.002    11         89   0.019    0.020    0.001     5        139   0.018    0.019    0.001     4
 40   0.021    0.023    0.002    11         90   0.019    0.020    0.001     5        140   0.018    0.019    0.001     4
 41   0.021    0.023    0.002    11         91   0.019    0.020    0.001     5        141   0.018    0.019    0.001     4
 42   0.020    0.022    0.002    11         92   0.018    0.019    0.001     5        142   0.024    0.019    0.005-   22-
 43   0.020    0.022    0.002    11         93   0.018    0.019    0.001     5        143   0.024    0.018    0.005-   22-
 44   0.019    0.021    0.002    11         94   0.018    0.019    0.001     5        144   0.024    0.018    0.005-   22-
 45   0.019    0.021    0.002    11         95   0.027    0.019    0.008-   30-       145   0.023    0.018    0.005-   22-
 46   0.018    0.020    0.002    11         96   0.027    0.019    0.008-   30-       146   0.023    0.018    0.005-   22-
 47   0.018    0.020    0.002    11         97   0.026    0.018    0.008-   30-       147   0.023    0.018    0.005-   22-
 48   0.035    0.020    0.016-   45-        98   0.026    0.018    0.008-   30-       148   0.023    0.018    0.005-   22-
 49   0.035    0.019    0.016-   45-        99   0.026    0.018    0.008-   30-       149   0.023    0.018    0.005-   22-
 50   0.034    0.019    0.015-   45-       100   0.026    0.018    0.008-   30-       150   0.023    0.018    0.005-   22-
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BIG BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 47       BUS $/KM......... .35
DRIVER $/KM............ .5       OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR-LOW END-$350000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM................ .47    2ND BUS $/KM................. .35
1ST DRIVER $/KM............ .5    2ND DRIVER $/KM............ .5
OVERHEAD $/KM.............. 0

PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %
-------------------------------      -------------------------------      -------------------------------
  1  0.850   0.970   0.120   14       51  0.033   0.019   0.014-  43-     101  0.025   0.018   0.007-  29-
  2  0.425   0.485   0.060   14       52  0.033   0.019   0.014-  43-     102  0.025   0.018   0.007-  29-
  3  0.283   0.323   0.040   14       53  0.032   0.018   0.014-  43-     103  0.025   0.018   0.007-  29-
  4  0.213   0.243   0.030   14       54  0.031   0.018   0.014-  43-     104  0.025   0.017   0.007-  29-
  5  0.170   0.194   0.024   14       55  0.031   0.018   0.013-  43-     105  0.024   0.017   0.007-  29-
  6  0.142   0.162   0.020   14       56  0.030   0.017   0.013-  43-     106  0.024   0.017   0.007-  29-
  7  0.121   0.139   0.017   14       57  0.030   0.017   0.013-  43-     107  0.024   0.017   0.007-  29-
  8  0.106   0.121   0.015   14       58  0.029   0.017   0.013-  43-     108  0.024   0.017   0.007-  29-
  9  0.094   0.108   0.013   14       59  0.029   0.016   0.012-  43-     109  0.023   0.017   0.007-  29-
 10  0.085   0.097   0.012   14       60  0.028   0.016   0.012-  43-     110  0.023   0.017   0.007-  29-
 11  0.077   0.088   0.011   14       61  0.028   0.016   0.012-  43-     111  0.023   0.016   0.007-  29-
 12  0.071   0.081   0.010   14       62  0.027   0.016   0.012-  43-     112  0.023   0.016   0.007-  29-
 13  0.065   0.075   0.009   14       63  0.027   0.015   0.012-  43-     113  0.023   0.016   0.006-  29-
 14  0.061   0.069   0.009   14       64  0.027   0.015   0.011-  43-     114  0.022   0.016   0.006-  29-
 15  0.057   0.065   0.008   14       65  0.026   0.015   0.011-  43-     115  0.022   0.016   0.006-  29-
 16  0.053   0.061   0.008   14       66  0.026   0.015   0.011-  43-     116  0.022   0.016   0.006-  29-
 17  0.050   0.057   0.007   14       67  0.025   0.014   0.011-  43-     117  0.022   0.016   0.006-  29-
 18  0.047   0.054   0.007   14       68  0.025   0.014   0.011-  43-     118  0.022   0.015   0.006-  29-
 19  0.045   0.051   0.006   14       69  0.025   0.014   0.011-  43-     119  0.021   0.015   0.006-  29-
 20  0.043   0.049   0.006   14       70  0.024   0.014   0.010-  43-     120  0.021   0.022   0.001    5
 21  0.040   0.046   0.006   14       71  0.024   0.014   0.010-  43-     121  0.021   0.022   0.001    5
 22  0.039   0.044   0.005   14       72  0.024   0.013   0.010-  43-     122  0.021   0.022   0.001    5
 23  0.037   0.042   0.005   14       73  0.023   0.025   0.002    7      123  0.021   0.022   0.001    5
 24  0.035   0.040   0.005   14       74  0.023   0.025   0.002    7      124  0.021   0.022   0.001    5
 25  0.034   0.039   0.005   14       75  0.023   0.024   0.002    7      125  0.020   0.021   0.001    5
 26  0.033   0.037   0.005   14       76  0.022   0.024   0.002    7      126  0.020   0.021   0.001    5
 27  0.031   0.036   0.004   14       77  0.022   0.024   0.002    7      127  0.020   0.021   0.001    5
 28  0.030   0.035   0.004   14       78  0.022   0.023   0.002    7      128  0.020   0.021   0.001    5
 29  0.029   0.033   0.004   14       79  0.022   0.023   0.002    7      129  0.020   0.021   0.001    5
 30  0.028   0.032   0.004   14       80  0.021   0.023   0.001    7      130  0.020   0.021   0.001    5
 31  0.027   0.031   0.004   14       81  0.021   0.022   0.001    7      131  0.019   0.020   0.001    5
 32  0.027   0.030   0.004   14       82  0.021   0.022   0.001    7      132  0.019   0.020   0.001    5
 33  0.026   0.029   0.004   14       83  0.020   0.022   0.001    7      133  0.019   0.020   0.001    5
 34  0.025   0.029   0.004   14       84  0.020   0.022   0.001    7      134  0.019   0.020   0.001    5
 35  0.024   0.028   0.003   14       85  0.020   0.021   0.001    7      135  0.019   0.020   0.001    5
 36  0.024   0.027   0.003   14       86  0.020   0.021   0.001    7      136  0.019   0.020   0.001    5
 37  0.023   0.026   0.003   14       87  0.020   0.021   0.001    7      137  0.019   0.019   0.001    5
 38  0.022   0.026   0.003   14       88  0.019   0.021   0.001    7      138  0.018   0.019   0.001    5
 39  0.022   0.025   0.003   14       89  0.019   0.020   0.001    7      139  0.018   0.019   0.001    5
 40  0.021   0.024   0.003   14       90  0.019   0.020   0.001    7      140  0.018   0.019   0.001    5
 41  0.021   0.024   0.003   14       91  0.019   0.020   0.001    7      141  0.018   0.019   0.001    5
 42  0.020   0.023   0.003   14       92  0.018   0.020   0.001    7      142  0.024   0.019   0.005-  21-
 43  0.020   0.023   0.003   14       93  0.018   0.020   0.001    7      143  0.024   0.019   0.005-  21-
 44  0.019   0.022   0.003   14       94  0.018   0.019   0.001    7      144  0.024   0.019   0.005-  21-
 45  0.019   0.022   0.003   14       95  0.027   0.019   0.008-  29-     145  0.023   0.018   0.005-  21-
 46  0.018   0.021   0.003   14       96  0.027   0.019   0.008-  29-     146  0.023   0.018   0.005-  21-
 47  0.018   0.021   0.003   14       97  0.026   0.019   0.008-  29-     147  0.023   0.018   0.005-  21-
 48  0.035   0.020   0.015-  43-      98  0.026   0.019   0.007-  29-     148  0.023   0.018   0.005-  21-
 49  0.035   0.020   0.015-  43-      99  0.026   0.018   0.007-  29-     149  0.023   0.018   0.005-  21-
 50  0.034   0.019   0.015-  43-     100  0.026   0.018   0.007-  29-     150  0.023   0.018   0.005-  21-
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G BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM.......... .74
RIVER $/KM............ .36         OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR-HIGH END COSTS-$250000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
ST BUS $/KM............... .88    2ND BUS $/KM................ .74
ST DRIVER $/KM............ .36    2ND DRIVER $/KM............. .36
OVERHEAD $/KM.............. 0

SS  BASE    TEST    DIFF    %        PASS BASE   TEST    DIFF    %       PASS  BASE   TEST    DIFF    %
------------------------------       -------------------------------     -------------------------------
 1  1.100   1.240   0.140   13        51  0.043  0.024   0.019-  44-     101  0.033  0.023   0.010-  29-
 2  0.550   0.620   0.070   13        52  0.042  0.024   0.018-  44-     102  0.032  0.023   0.009-  29-
 3  0.367   0.413   0.047   13        53  0.042  0.023   0.018-  44-     103  0.032  0.023   0.009-  29-
 4  0.275   0.310   0.035   13        54  0.041  0.023   0.018-  44-     104  0.032  0.022   0.009-  29-
 5  0.220   0.248   0.028   13        55  0.040  0.023   0.017-  44-     105  0.031  0.033   0.001    4
 6  0.183   0.207   0.023   13        56  0.039  0.022   0.017-  44-     106  0.031  0.032   0.001    4
 7  0.157   0.177   0.020   13        57  0.039  0.022   0.017-  44-     107  0.031  0.032   0.001    4
 8  0.138   0.155   0.017   13        58  0.038  0.021   0.017-  44-     108  0.031  0.032   0.001    4
 9  0.122   0.138   0.016   13        59  0.037  0.021   0.016-  44-     109  0.030  0.032   0.001    4
10  0.110   0.124   0.014   13        60  0.037  0.021   0.016-  44-     110  0.030  0.031   0.001    4
11  0.100   0.113   0.013   13        61  0.036  0.020   0.016-  44-     111  0.030  0.031   0.001    4
12  0.092   0.103   0.012   13        62  0.035  0.038   0.002    6      112  0.029  0.031   0.001    4
13  0.085   0.095   0.011   13        63  0.035  0.037   0.002    6      113  0.029  0.030   0.001    4
14  0.079   0.089   0.010   13        64  0.034  0.037   0.002    6      114  0.029  0.030   0.001    4
 5  0.073   0.083   0.009   13        65  0.034  0.036   0.002    6      115  0.029  0.030   0.001    4
16  0.069   0.077   0.009   13        66  0.033  0.035   0.002    6      116  0.028  0.030   0.001    4
17  0.065   0.073   0.008   13        67  0.033  0.035   0.002    6      117  0.028  0.029   0.001    4
18  0.061   0.069   0.008   13        68  0.032  0.034   0.002    6      118  0.028  0.029   0.001    4
 9  0.058   0.065   0.007   13        69  0.032  0.034   0.002    6      119  0.028  0.029   0.001    4
20  0.055   0.062   0.007   13        70  0.031  0.033   0.002    6      120  0.027  0.029   0.001    4
21  0.052   0.059   0.007   13        71  0.031  0.033   0.002    6      121  0.027  0.028   0.001    4
22  0.050   0.056   0.006   13        72  0.031  0.032   0.002    6      122  0.027  0.028   0.001    4
23  0.048   0.054   0.006   13        73  0.030  0.032   0.002    6      123  0.027  0.028   0.001    4
24  0.046   0.052   0.006   13        74  0.030  0.032   0.002    6      124  0.027  0.028   0.001    4
25  0.044   0.050   0.006   13        75  0.029  0.031   0.002    6      125  0.026  0.028   0.001    4
26  0.042   0.048   0.005   13        76  0.029  0.031   0.002    6      126  0.026  0.027   0.001    4
27  0.041   0.046   0.005   13        77  0.029  0.030   0.002    6      127  0.026  0.027   0.001    4
28  0.039   0.044   0.005   13        78  0.028  0.030   0.002    6      128  0.026  0.027   0.001    4
29  0.038   0.043   0.005   13        79  0.028  0.030   0.002    6      129  0.026  0.027   0.001    4
30  0.037   0.041   0.005   13        80  0.027  0.029   0.002    6      130  0.034  0.026   0.007-  22-
31  0.035   0.040   0.005   13        81  0.027  0.029   0.002    6      131  0.034  0.026   0.007-  22-
32  0.034   0.039   0.004   13        82  0.027  0.029   0.002    6      132  0.033  0.026   0.007-  22-
33  0.033   0.038   0.004   13        83  0.027  0.028   0.002    6      133  0.033  0.026   0.007-  22-
34  0.032   0.036   0.004   13        84  0.026  0.028   0.002    6      134  0.033  0.026   0.007-  22-
35  0.031   0.035   0.004   13        85  0.026  0.028   0.002    6      135  0.033  0.025   0.007-  22-
36  0.031   0.034   0.004   13        86  0.026  0.027   0.002    6      136  0.032  0.025   0.007-  22-
37  0.030   0.034   0.004   13        87  0.038  0.027   0.011-  29-     137  0.032  0.025   0.007-  22-
38  0.029   0.033   0.004   13        88  0.037  0.027   0.011-  29-     138  0.032  0.025   0.007-  22-
39  0.028   0.032   0.004   13        89  0.037  0.026   0.011-  29-     139  0.032  0.025   0.007-  22-
40  0.028   0.031   0.003   13        90  0.037  0.026   0.011-  29-     140  0.031  0.025   0.007-  22-
41  0.027   0.030   0.003   13        91  0.036  0.026   0.011-  29-     141  0.031  0.024   0.007-  22-
42  0.026   0.030   0.003   13        92  0.036  0.025   0.010-  29-     142  0.031  0.024   0.007-  22-
43  0.026   0.029   0.003   13        93  0.035  0.025   0.010-  29-     143  0.031  0.024   0.007-  22-
44  0.050   0.028   0.022-  44-       94  0.035  0.025   0.010-  29-     144  0.031  0.024   0.007-  22-
45  0.049   0.028   0.021-  44-       95  0.035  0.025   0.010-  29-     145  0.030  0.024   0.007-  22-
46  0.048   0.027   0.021-  44-       96  0.034  0.024   0.010-  29-     146  0.030  0.024   0.007-  22-
47  0.047   0.026   0.020-  44-       97  0.034  0.024   0.010-  29-     147  0.030  0.023   0.007-  22-
48  0.046   0.026   0.020-  44-       98  0.034  0.024   0.010-  29-     148  0.030  0.031   0.001    3
19  0.045   0.025   0.020-  44-       99  0.033  0.024   0.010-  29-     149  0.030  0.030   0.001    3
30  0.044   0.025   0.019-  44-      100  0.033  0.023   0.010-  29-     150  0.029  0.030   0.001    3
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BIG BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM.......... .74
DRIVER $/KM............. .36       OVERHEAD $/KM..... 0
SCENARIO ¢SMALL OPERATOR-HIGH END COSTS-$350000
1ST UNIT SEATING CAPACITY.... 61   2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... 1.04   2ND BUS $/KM................. .74
1ST DRIVER $/KM............ .36   2ND DRIVER $/KM............. .36
OVERHEAD $/KM.............. 0

PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %
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  1  1.100   1.400   0.300   27       51  0.043   0.027   0.016-  36-     101  0.033   0.025   0.008-  24-
  2  0.550   0.700   0.150   27       52  0.042   0.027   0.015-  36-     102  0.032   0.025   0.008-  24-
  3  0.367   0.467   0.100   27       53  0.042   0.026   0.015-  36-     103  0.032   0.024   0.008-  24-
  4  0.275   0.350   0.075   27       54  0.041   0.026   0.015-  36-     104  0.032   0.024   0.008-  24-
  5  0.220   0.280   0.060   27       55  0.040   0.025   0.015-  36-     105  0.031   0.034   0.003    9
  6  0.183   0.233   0.050   27       56  0.039   0.025   0.014-  36-     106  0.031   0.034   0.003    9
  7  0.157   0.200   0.043   27       57  0.039   0.025   0.014-  36-     107  0.031   0.034   0.003    9
  8  0.138   0.175   0.037   27       58  0.038   0.024   0.014-  36-     108  0.031   0.033   0.003    9
  9  0.122   0.156   0.033   27       59  0.037   0.024   0.014-  36-     109  0.030   0.033   0.003    9
 10  0.110   0.140   0.030   27       60  0.037   0.023   0.013-  36-     110  0.030   0.033   0.003    9
 11  0.100   0.127   0.027   27       61  0.036   0.023   0.013-  36-     111  0.030   0.032   0.003    9
 12  0.092   0.117   0.025   27       62  0.035   0.040   0.005   14      112  0.029   0.032   0.003    9
 13  0.085   0.108   0.023   27       63  0.035   0.040   0.005   14      113  0.029   0.032   0.003    9
 14  0.079   0.100   0.021   27       64  0.034   0.039   0.005   14      114  0.029   0.032   0.003    9
 15  0.073   0.093   0.020   27       65  0.034   0.038   0.005   14      115  0.029   0.031   0.003    9
 16  0.069   0.087   0.019   27       66  0.033   0.038   0.005   14      116  0.028   0.031   0.003    9
 17  0.065   0.062   0.018   27       67  0.033   0.037   0.004   14      117  0.028   0.031   0.003    9
 18  0.061   0.078   0.017   27       68  0.032   0.037   0.004   14      118  0.028   0.031   0.003    9
 19  0.058   0.074   0.016   27       69  0.032   0.036   0.004   14      119  0.028   0.030   0.003    9
 20  0.055   0.070   0.015   27       70  0.031   0.036   0.004   14      120  0.027   0.030   0.002    9
 21  0.052   0.067   0.014   27       71  0.031   0.035   0.004   14      121  0.027   0.030   0.002    9
 22  0.050   0.064   0.014   27       72  0.031   0.035   0.004   14      122  0.027   0.030   0.002    9
 23  0.048   0.061   0.013   27       73  0.030   0.034   0.004   14      123  0.027   0.029   0.002    9
 24  0.046   0.058   0.012   27       74  0.030   0.034   0.004   14      124  0.027   0.029   0.002    9
 25  0.044   0.056   0.012   27       75  0.029   0.033   0.004   14      125  0.026   0.029   0.002    9
 26  0.042   0.054   0.012   27       76  0.029   0.033   0.004   14      126  0.026   0.029   0.002    9
 27  0.041   0.052   0.011   27       77  0.029   0.032   0.004   14      127  0.026   0.028   0.002    9
 28  0.039   0.050   0.011   27       78  0.028   0.032   0.004   14      128  0.026   0.028   0.002    9
 29  0.038   0.048   0.010   27       79  0.028   0.032   0.004   14      129  0.026   0.028   0.002    9
 30  0.037   0.047   0.010   27       80  0.027   0.031   0.004   14      130  0.034   0.028   0.006-  18-
 31  0.035   0.045   0.010   27       81  0.027   0.031   0.004   14      131  0.034   0.027   0.006-  18-
 32  0.034   0.044   0.009   27       82  0.027   0.030   0.004   14      132  0.033   0.027   0.006-  18-
 33  0.033   0.042   0.009   27       83  0.027   0.030   0.004   14      133  0.033   0.027   0.006-  18-
 34  0.032   0.041   0.009   27       84  0.026   0.030   0.004   14      134  0.033   0.027   0.006-  18-
 35  0.031   0.040   0.009   27       85  0.026   0.029   0.004   14      135  0.033   0.027   0.006-  18-
 36  0.031   0.039   0.008   27       86  0.026   0.029   0.003   14      136  0.032   0.026   0.006-  18-
 37  0.030   0.038   0.008   27       87  0.038   0.029   0.009-  24-     137  0.032   0.026   0.006-  18-
 38  0.029   0.037   0.008   27       88  0.037   0.028   0.009-  24-     138  0.032   0.026   0.006-  18-
 39  0.028   0.036   0.008   27       89  0.037   0.028   0.009-  24-     139  0.032   0.026   0.006-  18-
 40  0.028   0.035   0.007   27       90  0.037   0.028   0.009-  24-     140  0.031   0.026   0.006-  18-
 41  0.027   0.034   0.007   27       91  0.036   0.027   0.009-  24-     141  0.031   0.026   0.006-  18-
 42  0.026   0.033   0.007   27       92  0.036   0.027   0.009-  24-     142  0.031   0.025   0.006-  18-
 43  0.026   0.033   0.007   27       93  0.035   0.027   0.009-  24-     143  0.031   0.025   0.006-  18-
 44  0.050   0.032   0.018-  36-      94  0.035   0.027   0.009-  24-     144  0.031   0.025   0.006-  18-
 45  0.049   0.031   0.018-  36-      95  0.035   0.026   0.008-  24-     145  0.030   0.025   0.006-  18-
 46  0.048   0.030   0.017-  36-      96  0.034   0.026   0.008-  24-     146  0.030   0.025   0.005-  18-
 47  0.047   0.030   0.017-  36-      97  0.034   0.026   0.008-  24-     147  0.030   0.024   0.005-  18-
 48  0.046   0.029   0.017-  36-      98  0.034   0.026   0.008-  24-     148  0.030   0.032   0.002    7
 49  0.045   0.029   0.016-  36-      99  0.033   0.025   0.008-  24-     149  0.030   0.032   0.002    7
 50  0.044   0.028   0.016-  36-     100  0.033   0.025   0.008-  24-     150  0.029   0.031   0.002    7
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  BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .4
 RIVER $/KM............ .24        OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR-LOW END COSTS-$250000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
 ST BUS $/KM................ .5    2ND BUS $/KM................ .4
 ST DRIVER $/KM............ .24    2ND DRIVER $/KM............ .24
OVERHEAD $/KM.............. 0

  SS   BASE      TEST      DIFF     %       PASS  BASE      TEST      DIFF     %       PASS  BASE      TEST      DIFF     %
-------------------------------------       -------------------------------------      -------------------------------------

   1  0.640     0.740     0.100    16        51  0.025     0.015     0.011-   42-       101  0.019     0.014     0.005-   28-
   2  0.320     0.370     0.050    16        52  0.025     0.014     0.010-   42-       102  0.019     0.014     0.005-   28-
   3  0.213     0.247     0.033    16        53  0.024     0.014     0.010-   42-       103  0.019     0.013     0.005-   28-
   4  0.160     0.185     0.025    16        54  0.024     0.014     0.010-   42-       104  0.018     0.013     0.005-   28-
   5  0.128     0.148     0.020    16        55  0.023     0.013     0.010-   42-       105  0.018     0.013     0.005-   28-
   6  0.107     0.123     0.017    16        56  0.023     0.013     0.010-   42-       106  0.018     0.013     0.005-   28-
   7  0.091     0.106     0.014    16        57  0.022     0.013     0.009-   42-       107  0.018     0.013     0.005-   28-
   8  0.080     0.093     0.013    16        58  0.022     0.013     0.009-   42-       108  0.018     0.013     0.005-   28-
   9  0.071     0.082     0.011    16        59  0.022     0.013     0.009-   42-       109  0.018     0.013     0.005-   28-
  10  0.064     0.074     0.010    16        60  0.021     0.012     0.009-   42-       110  0.017     0.013     0.005-   28-
  11  0.058     0.067     0.009    16        61  0.021     0.012     0.009-   42-       111  0.017     0.012     0.005-   28-
   2  0.053     0.062     0.008    16        62  0.021     0.012     0.009-   42-       112  0.017     0.012     0.005-   28-
   3  0.049     0.057     0.008    16        63  0.020     0.012     0.009-   42-       113  0.017     0.012     0.005-   28-
  14  0.046     0.053     0.007    16        64  0.020     0.012     0.008-   42-       114  0.017     0.012     0.005-   28-
   5  0.043     0.049     0.007    16        65  0.020     0.011     0.008-   42-       115  0.017     0.012     0.005-   28-
   6  0.040     0.046     0.006    16        66  0.019     0.011     0.008-   42-       116  0.017     0.012     0.005-   28-
  17  0.038     0.044     0.006    16        67  0.019     0.011     0.008-   42-       117  0.016     0.012     0.005-   28-
  18  0.036     0.041     0.006    16        68  0.019     0.011     0.008-   42-       118  0.016     0.012     0.005-   28-
   9  0.034     0.039     0.005    16        69  0.019     0.011     0.008-   42-       119  0.016     0.012     0.005-   28-
  20  0.032     0.037     0.005    16        70  0.018     0.011     0.008-   42-       120  0.016     0.017     0.001     5
  21  0.030     0.035     0.005    16        71  0.018     0.010     0.008-   42-       121  0.016     0.017     0.001     5
   2  0.029     0.034     0.005    16        72  0.018     0.010     0.007-   42-       122  0.016     0.017     0.001     5
   3  0.028     0.032     0.004    16        73  0.018     0.019     0.001     8        123  0.016     0.016     0.001     5
  24  0.027     0.031     0.004    16        74  0.017     0.019     0.001     8        124  0.015     0.016     0.001     5
   5  0.026     0.030     0.004    16        75  0.017     0.018     0.001     8        125  0.015     0.016     0.001     5
   6  0.025     0.028     0.004    16        76  0.017     0.018     0.001     8        126  0.015     0.016     0.001     5
  27  0.024     0.027     0.004    16        77  0.017     0.018     0.001     8        127  0.015     0.016     0.001     5
  28  0.023     0.026     0.004    16        78  0.016     0.018     0.001     8        128  0.015     0.016     0.001     5
   9  0.022     0.026     0.003    16        79  0.016     0.017     0.001     8        129  0.015     0.016     0.001     5
  30  0.021     0.025     0.003    16        80  0.016     0.017     0.001     8        130  0.015     0.016     0.001     5
  31  0.021     0.024     0.003    16        81  0.016     0.017     0.001     8        131  0.015     0.015     0.001     5
   2  0.020     0.023     0.003    16        82  0.016     0.017     0.001     8        132  0.015     0.015     0.001     5
   3  0.019     0.022     0.003    16        83  0.015     0.017     0.001     8        133  0.014     0.015     0.001     5
  34  0.019     0.022     0.003    16        84  0.015     0.016     0.001     8        134  0.014     0.015     0.001     5
   5  0.018     0.021     0.003    16        85  0.015     0.016     0.001     8        135  0.014     0.015     0.001     5
   6  0.018     0.021     0.003    16        86  0.015     0.016     0.001     8        136  0.014     0.015     0.001     5
  37  0.017     0.020     0.003    16        87  0.015     0.016     0.001     8        137  0.014     0.015     0.001     5
  38  0.017     0.019     0.003    16        88  0.015     0.016     0.001     8        138  0.014     0.015     0.001     5
   9  0.016     0.019     0.003    16        89  0.014     0.016     0.001     8        139  0.014     0.015     0.001     5
  40  0.016     0.019     0.003    16        90  0.014     0.015     0.001     8        140  0.014     0.014     0.001     5
  41  0.016     0.018     0.002    16        91  0.014     0.015     0.001     8        141  0.014     0.014     0.001     5
   2  0.015     0.018     0.002    16        92  0.014     0.015     0.001     8        142  0.018     0.014     0.004-   21-
   3  0.015     0.017     0.002    16        93  0.014     0.015     0.001     8        143  0.018     0.014     0.004-   21-
  44  0.015     0.017     0.002    16        94  0.014     0.015     0.001     8        144  0.018     0.014     0.004-   21-
   5  0.014     0.016     0.002    16        95  0.020     0.015     0.006-   28-       145  0.018     0.014     0.004-   21-
   6  0.014     0.016     0.002    16        96  0.020     0.014     0.006-   28-       146  0.018     0.014     0.004-   21-
  47  0.014     0.016     0.002    16        97  0.020     0.014     0.006-   28-       147  0.017     0.014     0.004-   21-
  48  0.027     0.015     0.011-   42-       98  0.020     0.014     0.006-   28-       148  0.017     0.014     0.004-   21-
   9  0.026     0.015     0.011-   42-       99  0.019     0.014     0.005-   28-       149  0.017     0.014     0.004-   21-
  50  0.026     0.015     0.011-   42-      100  0.019     0.014     0.005-   28-       150  0.017     0.013     0.004-   21-
-------------------------------------       -------------------------------------      -------------------------------------
```

```
BIG BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 47          BUS $/KM......... .4
DRIVER $/KM............. .24         OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR-LOW END COSTS-$350000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM................ .57    2ND BUS $/KM................. .4
1ST DRIVER $/KM............. .24    2ND DRIVER $/KM............. .24
OVERHEAD $/KM............... 0

PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %      PASS  BASE    TEST    DIFF    %
------------------------------------   ------------------------------------   ------------------------------------
  1  0.640   0.810   0.170   27       51  0.025   0.016   0.009-  37-     101  0.019   0.014   0.005-  24-
  2  0.320   0.405   0.085   27       52  0.025   0.016   0.009-  37-     102  0.019   0.014   0.005-  24-
  3  0.213   0.270   0.057   27       53  0.024   0.015   0.009-  37-     103  0.019   0.014   0.005-  24-
  4  0.160   0.202   0.042   27       54  0.024   0.015   0.009-  37-     104  0.018   0.014   0.005-  24-
  5  0.128   0.162   0.034   27       55  0.023   0.015   0.009-  37-     105  0.018   0.014   0.004-  24-
  6  0.107   0.135   0.028   27       56  0.023   0.014   0.008-  37-     106  0.018   0.014   0.004-  24-
  7  0.091   0.116   0.024   27       57  0.022   0.014   0.008-  37-     107  0.018   0.014   0.004-  24-
  8  0.080   0.101   0.021   27       58  0.022   0.014   0.008-  37-     108  0.018   0.013   0.004-  24-
  9  0.071   0.090   0.019   27       59  0.022   0.014   0.008-  37-     109  0.018   0.013   0.004-  24-
 10  0.064   0.081   0.017   27       60  0.021   0.014   0.008-  37-     110  0.017   0.013   0.004-  24-
 11  0.058   0.074   0.015   27       61  0.021   0.013   0.008-  37-     111  0.017   0.013   0.004-  24-
 12  0.053   0.067   0.014   27       62  0.021   0.013   0.008-  37-     112  0.017   0.013   0.004-  24-
 13  0.049   0.062   0.013   27       63  0.020   0.013   0.007-  37-     113  0.017   0.013   0.004-  24-
 14  0.046   0.058   0.012   27       64  0.020   0.013   0.007-  37-     114  0.017   0.013   0.004-  24-
 15  0.043   0.054   0.011   27       65  0.020   0.012   0.007-  37-     115  0.017   0.013   0.004-  24-
 16  0.040   0.051   0.011   27       66  0.019   0.012   0.007-  37-     116  0.017   0.012   0.004-  24-
 17  0.038   0.048   0.010   27       67  0.019   0.012   0.007-  37-     117  0.016   0.012   0.004-  24-
 18  0.036   0.045   0.009   27       68  0.019   0.012   0.007-  37-     118  0.016   0.012   0.004-  24-
 19  0.034   0.043   0.009   27       69  0.019   0.012   0.007-  37-     119  0.016   0.012   0.004-  24-
 20  0.032   0.041   0.009   27       70  0.018   0.012   0.007-  37-     120  0.016   0.017   0.001    9
 21  0.030   0.039   0.008   27       71  0.018   0.011   0.007-  37-     121  0.016   0.017   0.001    9
 22  0.029   0.037   0.008   27       72  0.018   0.011   0.007-  37-     122  0.016   0.017   0.001    9
 23  0.028   0.035   0.007   27       73  0.018   0.020   0.002   13      123  0.016   0.017   0.001    9
 24  0.027   0.034   0.007   27       74  0.017   0.020   0.002   13      124  0.015   0.017   0.001    9
 25  0.026   0.032   0.007   27       75  0.017   0.019   0.002   13      125  0.015   0.017   0.001    9
 26  0.025   0.031   0.007   27       76  0.017   0.019   0.002   13      126  0.015   0.017   0.001    9
 27  0.024   0.030   0.006   27       77  0.017   0.019   0.002   13      127  0.015   0.016   0.001    9
 28  0.023   0.029   0.006   27       78  0.016   0.019   0.002   13      128  0.015   0.016   0.001    9
 29  0.022   0.028   0.006   27       79  0.016   0.018   0.002   13      129  0.015   0.016   0.001    9
 30  0.021   0.027   0.006   27       80  0.016   0.018   0.002   13      130  0.015   0.016   0.001    9
 31  0.021   0.026   0.005   27       81  0.016   0.018   0.002   13      131  0.015   0.016   0.001    9
 32  0.020   0.025   0.005   27       82  0.016   0.018   0.002   13      132  0.015   0.016   0.001    9
 33  0.019   0.025   0.005   27       83  0.015   0.017   0.002   13      133  0.014   0.016   0.001    9
 34  0.019   0.024   0.005   27       84  0.015   0.017   0.002   13      134  0.014   0.016   0.001    9
 35  0.018   0.023   0.005   27       85  0.015   0.017   0.002   13      135  0.014   0.015   0.001    9
 36  0.018   0.023   0.005   27       86  0.015   0.017   0.002   13      136  0.014   0.015   0.001    9
 37  0.017   0.022   0.005   27       87  0.015   0.017   0.002   13      137  0.014   0.015   0.001    9
 38  0.017   0.021   0.004   27       88  0.015   0.016   0.002   13      138  0.014   0.015   0.001    9
 39  0.016   0.021   0.004   27       89  0.014   0.016   0.002   13      139  0.014   0.015   0.001    9
 40  0.016   0.020   0.004   27       90  0.014   0.016   0.002   13      140  0.014   0.015   0.001    9
 41  0.016   0.020   0.004   27       91  0.014   0.016   0.002   13      141  0.014   0.015   0.001    9
 42  0.015   0.019   0.004   27       92  0.014   0.016   0.002   13      142  0.018   0.015   0.003-  18-
 43  0.015   0.019   0.004   27       93  0.014   0.016   0.002   13      143  0.018   0.015   0.003-  18-
 44  0.015   0.018   0.004   27       94  0.014   0.015   0.002   13      144  0.018   0.015   0.003-  18-
 45  0.014   0.018   0.004   27       95  0.020   0.015   0.005-  24-     145  0.018   0.014   0.003-  18-
 46  0.014   0.018   0.004   27       96  0.020   0.015   0.005-  24-     146  0.018   0.014   0.003-  18-
 47  0.014   0.017   0.004   27       97  0.020   0.015   0.005-  24-     147  0.017   0.014   0.003-  18-
 48  0.027   0.017   0.010-  37-      98  0.020   0.015   0.005-  24-     148  0.017   0.014   0.003-  18-
 49  0.026   0.017   0.010-  37-      99  0.019   0.015   0.005-  24-     149  0.017   0.014   0.003-  18-
 50  0.026   0.016   0.009-  37-     100  0.019   0.014   0.005-  24-     150  0.017   0.014   0.003-  18-
------------------------------------   ------------------------------------   ------------------------------------
```

```
[illegible]

[illegible] CHARGE OPERATION LOW AND [illegible]
1ST UNIT SEATING CAPACITY..... [illegible]    2ND UNIT SEATING CAPACITY .... 4
1ST BUS $/KM................ .47    2ND BUS $/KM................ [illegible]
1ST DRIVER $/KM............ .2    2ND DRIVER $/KM............. .2
OVERHEAD $/KM.............. [illegible]


        DEMAND WEIGHTED COSTS

 ------------------------------------------------------
                        COST ($US)
               ---------------------------------------
 SPACE   %DMD     BASE      TEST     DIFF    %
 ------------------------------------------------------
   [illegible]     24      0.06      0.05    0.01    [illegible]
   [illegible]     14      0.02      0.03    0.00    [illegible]
   [illegible]     11      0.02      0.02    0.00    [illegible]
   [illegible]     10      0.02      0.02    0.01-   [illegible]
   60      [illegible]      0.02      0.02    0.01-   [illegible]
   [illegible]      [illegible]      0.02      0.01    0.0[illegible]-   [illegible]
   90      [illegible]      0.02      0.02    0.00    [illegible]
   [illegible]      5      0.02      0.02    0.00    [illegible]
  100      5      0.02      0.02    0.01-   [illegible]-
  [illegible]      [illegible]      0.02      0.02    0.00    [illegible]
 WEIGHTED COSTS    0.03      0.03    0.00    [illegible]
 ------------------------------------------------------


[illegible] BUS
[illegible] CAPACITY ..... [illegible]        BUS $/KM........... .[illegible]
[illegible]................ [illegible]         OVERHEAD $/KM...... [illegible]
[illegible] OPERATION LOW [illegible]
[illegible] CAPACITY..... [illegible]    2ND UNIT SEATING CAPACITY .... [illegible]
[illegible] $/KM................ [illegible]    2ND BUS $/KM.................. [illegible]
[illegible] DRIVER $/KM............ [illegible]    2ND DRIVER $/KM............. [illegible]
[illegible] $/KM, ............


        [illegible] WEIGHTED [illegible]

 ------------------------------------------------------
                        [illegible]
               ---------------------------------------
 [illegible]     %DMD     BASE      TEST     DIFF    %
 ------------------------------------------------------
   [illegible]     24      0.0[illegible]      0.05    0.01    [illegible]
   [illegible]     14      [illegible]      0.03    0.0[illegible]    [illegible]
   40     11      [illegible]      0.02    0.00    [illegible]
   [illegible]     10      [illegible]      [illegible]    [illegible]    [illegible]
   [illegible]      [illegible]      0.03      0.02    0.01    [illegible]
           [illegible]      0.0[illegible]      [illegible]    0.0[illegible]    4[illegible]
   [illegible]      [illegible]      0.0[illegible]      0.0[illegible]    0.0[illegible]    [illegible]
           [illegible]      0.02      0.0[illegible]    0.0[illegible]
  10[illegible]      5      0.02      0.02    0.0[illegible]-   [illegible]
  [illegible]      [illegible]      0.02      0.02    0.0[illegible]    [illegible]
 WEIGHTED COSTS    0.03      0.03    0.00-   4[illegible]
 ------------------------------------------------------
```

```
BIG BUS COST ESTIMATING MODEL

SCENARIO :LARGE OPERATOR-HIGH END-$350000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM................ .81    2ND BUS $/KM................. .59
1ST DRIVER $/KM............ .6    2ND DRIVER $/KM............ .6
OVERHEAD $/KM............. 0


          DEMAND WEIGHTED COSTS


----------------------------------------------
                      COST/PASS-KM
                ------------------------------
#PASS   %DMD    BASE     TEST   DIFF    %
----------------------------------------------
  15     24     0.08     0.09   0.01   18
  30     14     0.04     0.05   0.01   18
  40     12     0.03     0.04   0.01   18
  50     10     0.05     0.03   0.02-  41-
  60      8     0.04     0.02   0.02-  41-
  70      7     0.03     0.04   0.00    9
  80      7     0.03     0.03   0.00    9
  90      5     0.04     0.03   0.01-  27-
 100      5     0.04     0.03   0.01-  27-
 120      8     0.03     0.03   0.00    6
WEIGHTED COSTS  0.05     0.05   0.00    3
----------------------------------------------
```

```
SCENARIO :LARGE OPERATOR-HIGH END-$250000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM................ .71    2ND BUS $/KM................. .59
1ST DRIVER $/KM............ .6    2ND DRIVER $/KM............ .6
OVERHEAD $/KM............. 0


          DEMAND WEIGHTED COSTS


----------------------------------------------
                      COST/PASS-KM
                ------------------------------
#PASS   %DMD    BASE     TEST   DIFF    %
----------------------------------------------
  15     24     0.08     0.09   0.01   10
  30     14     0.04     0.04   0.00   10
  40     12     0.03     0.03   0.00   10
  50     10     0.05     0.03   0.02-  45-
  60      8     0.04     0.02   0.02-  45-
  70      7     0.03     0.04   0.00    5
  80      7     0.03     0.03   0.00    5
  90      5     0.04     0.03   0.01-  30-
 100      5     0.04     0.03   0.01-  30-
 120      8     0.03     0.03   0.00    3
WEIGHTED COSTS  0.05     0.05   0.00-   3-
----------------------------------------------
```

```
10 BUS COST ESTIMATING MODEL

SCENARIO :SMALL OPERATOR-HIGH END COSTS-$350000
ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... 1.04    2ND BUS $/KM................ .74
1ST DRIVER $/KM............ .36    2ND DRIVER $/KM............. .36
OVERHEAD $/KM............. 0


         DEMAND WEIGHTED COSTS


----------------------------------------------
                      COST/PASS-KM
                 -----------------------------
 #PASS   %DMD     BASE      TEST    DIFF   %
----------------------------------------------
    15     24      0.07      0.09   0.02   27
    30     14      0.04      0.05   0.01   27
    40     12      0.03      0.03   0.01   27
    50     10      0.04      0.03   0.02-  36-
    60      8      0.04      0.02   0.01-  36-
    70      7      0.03      0.04   0.00   14
    80      7      0.03      0.03   0.00   14
    90      5      0.04      0.03   0.01-  24-
   100      5      0.03      0.02   0.01-  24-
   120      8      0.03      0.03   0.00    9
WEIGHTED COSTS     0.04      0.05   0.00   10
----------------------------------------------


SCENARIO :SMALL OPERATOR-HIGH END COSTS-$250000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... .88    2ND BUS $/KM................ .74
1ST DRIVER $/KM............ .36    2ND DRIVER $/KM............. .36
OVERHEAD $/KM............. 0


         DEMAND WEIGHTED COSTS


----------------------------------------------
                      COST/PASS-KM
                 -----------------------------
 #PASS   %DMD     BASE      TEST    DIFF   %
----------------------------------------------
    15     24      0.07      0.08   0.01   13
    30     14      0.04      0.04   0.00   13
    40     12      0.03      0.03   0.00   13
    50     10      0.04      0.02   0.02-  44-
    60      8      0.04      0.02   0.02-  44-
    70      7      0.03      0.03   0.00    6
    80      7      0.03      0.03   0.00    6
    90      5      0.04      0.03   0.01-  29-
   100      5      0.03      0.02   0.01-  29-
   120      8      0.03      0.03   0.00    4
EIGHTED COSTS      0.04      0.04   0.00-   1-
----------------------------------------------
```

```
    BUS COST ESTIMATING MODEL

SCENARIO :SMALL OPERATOR-LOW END COSTS-$350000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM............... .57    2ND BUS $/KM................ .4
1ST DRIVER $/KM............ .24    2ND DRIVER $/KM............ .24
OVERHEAD $/KM.............. 0


        DEMAND WEIGHTED COSTS

 -----------------------------------------------
                        COST/PASS-KM
                 ------------------------------
 #PASS   %DMD     BASE      TEST    DIFF   %
 ----------------------------------------------
   15     24      0.04      0.05   0.01   27
   30     14      0.02      0.03   0.01   27
   40     12      0.02      0.02   0.00   27
   50     10      0.03      0.02   0.01-  37-
   60      8      0.02      0.01   0.01-  37-
   70      7      0.02      0.01   0.01-  37-
   80      7      0.02      0.02   0.00   13
   90      5      0.01      0.02   0.00   13
  100      5      0.02      0.01   0.00-  24-
  120      8      0.02      0.02   0.00    9
 WEIGHTED COSTS   0.02      0.03   0.00    9
 -----------------------------------------------


BASELINE BUS
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .4
DRIVER $/KM............ .24       OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR-LOW END COSTS-$250000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM............... .5    2ND BUS $/KM................ .4
1ST DRIVER $/KM............ .24    2ND DRIVER $/KM............ .24
OVERHEAD $/KM.............. 0


        DEMAND WEIGHTED COSTS

 -----------------------------------------------
                        COST/PASS-KM
                 ------------------------------
 #PASS   %DMD     BASE      TEST    DIFF   %
 ----------------------------------------------
   15     24      0.04      0.05   0.01   16
   30     14      0.02      0.02   0.00   16
   40     12      0.02      0.02   0.00   16
   50     10      0.03      0.01   0.01-  42-
   60      8      0.02      0.01   0.01-  42-
   70      7      0.02      0.01   0.01-  42-
   80      7      0.02      0.02   0.00    8
   90      5      0.01      0.02   0.00    8
  100      5      0.02      0.01   0.01-  28-
  120      8      0.02      0.02   0.00    5
 WEIGHTED COSTS   0.02      0.02   0.00-   0-
 -----------------------------------------------
```

```
BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .59
DRIVER $/KM............ .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR BASELINE HI-LO COST COMPARISON
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .35
DRIVER $/KM............ .5        OVERHEAD $/KM..... 0


        DEMAND WEIGHTED COSTS


------------------------------------------------
                      COST/PASS-KM
                -----------------------------------
 #PASS   %DMD     BASE       TEST     DIFF   %
------------------------------------------------

    10    30       0.12       0.08   0.03-  29-
    20    27       0.06       0.04   0.02-  29-
    30    20       0.04       0.03   0.01-  29-
    40    15       0.03       0.02   0.01-  29-
    50     7       0.05       0.03   0.01-  29-
    60     1       0.04       0.03   0.01-  29-
WEIGHTED COSTS     0.07       0.05   0.02-  29-
------------------------------------------------




BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .74
DRIVER $/KM............ .36       OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR BASELINE HI-LO COST COMPARISON
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .4
DRIVER $/KM............ .24       OVERHEAD $/KM..... 0


        DEMAND WEIGHTED COSTS


------------------------------------------------
                      COST/PASS-KM
                -----------------------------------
 #PASS   %DMD     BASE       TEST     DIFF   %
------------------------------------------------

    10    30       0.11       0.06   0.05-  42-
    20    27       0.06       0.03   0.02-  42-
    30    20       0.04       0.02   0.02-  42-
    40    15       0.03       0.02   0.01-  42-
    50     7       0.04       0.03   0.02-  42-
    60     1       0.04       0.02   0.02-  42-
WEIGHTED COSTS     0.06       0.04   0.03-  42-
------------------------------------------------
```

```
BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .59
DRIVER $/KM............ .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR -HIGH END-$350000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... .81    2ND BUS $/KM................ .59
1ST DRIVER $/KM............ .6    2ND DRIVER $/KM............. .6
OVERHEAD $/KM.............. 0


        DEMAND WEIGHTED COSTS


------------------------------------------------
                    COST/PASS-KM
                 -------------------------------
#PASS   %DMD     BASE      TEST    DIFF   %
------------------------------------------------

   10     30      0.12      0.14   0.02   18
   20     27      0.06      0.07   0.01   18
   30     20      0.04      0.05   0.01   18
   40     15      0.03      0.04   0.01   18
   50      7      0.05      0.03   0.02-  41-
   60      1      0.04      0.02   0.02-  41-
WEIGHTED COSTS    0.07      0.08   0.01   15
------------------------------------------------



SCENARIO :LARGE OPERATOR-HIGH END-$250000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... .71    2ND BUS $/KM................ .59
1ST DRIVER $/KM............ .6    2ND DRIVER $/KM............. .6
OVERHEAD $/KM.............. 0


        DEMAND WEIGHTED COSTS


------------------------------------------------
                    COST/PASS-KM
                 -------------------------------
#PASS   %DMD     BASE      TEST    DIFF   %
------------------------------------------------

   10     30      0.12      0.13   0.01   10
   20     27      0.06      0.07   0.01   10
   30     20      0.04      0.04   0.00   10
   40     15      0.03      0.03   0.00   10
   50      7      0.05      0.03   0.02-  45-
   60      1      0.04      0.02   0.02-  45-
WEIGHTED COSTS    0.07      0.07   0.00    7
------------------------------------------------
```

```
110 BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .35
DRIVER $/KM............ .5        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR-LOW END-$350000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM............... .47    2ND BUS $/KM................ .35
1ST DRIVER $/KM............ .5    2ND DRIVER $/KM............ .5
OVERHEAD $/KM.............. 0


         DEMAND WEIGHTED COSTS

-----------------------------------------------
                        COST/PASS-KM
                ------------------------------
#PASS   %DMD      BASE       TEST    DIFF   %
-----------------------------------------------
   10     30      0.08       0.10   0.01   14
   20     27      0.04       0.05   0.01   14
   30     20      0.03       0.03   0.00   14
   40     15      0.02       0.02   0.00   14
   50      7      0.03       0.02   0.01-  43-
   60      1      0.03       0.02   0.01-  43-
WEIGHTED COSTS    0.05       0.05   0.01   11
-----------------------------------------------


BASELINE BUS
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .35
DRIVER $/KM............ .5        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR-LOW END-$250000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM............... .44    2ND BUS $/KM................ .35
1ST DRIVER $/KM............ .5    2ND DRIVER $/KM............ .5
OVERHEAD $/KM.............. 0


         DEMAND WEIGHTED COSTS

-----------------------------------------------
                        COST/PASS-KM
                ------------------------------
#PASS   %DMD      BASE       TEST    DIFF   %
-----------------------------------------------
   10     30      0.08       0.09   0.01   11
   20     27      0.04       0.05   0.00   11
   30     20      0.03       0.03   0.00   11
   40     15      0.02       0.02   0.00   11
   50      7      0.03       0.02   0.02-  45-
   60      1      0.03       0.02   0.01-  45-
WEIGHTED COSTS    0.05       0.05   0.00    8
-----------------------------------------------
```

```
BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .74
DRIVER $/KM............ .36        OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR-HIGH END COSTS-$350000
1ST UNIT SEATING CAPACITY.... 61   2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... 1.04   2ND BUS $/KM................ .74
1ST DRIVER $/KM............ .36   2ND DRIVER $/KM....\......... .36
OVERHEAD $/KM.............. 0


          DEMAND WEIGHTED COSTS


 ------------------------------------------------
                        COST/PASS-KM
                 ---------------------------------
 #PASS    %DMD     BASE       TEST    DIFF   %
 ------------------------------------------------
   10      30      0.11       0.14    0.03   27
   20      27      0.06       0.07    0.01   27
   30      20      0.04       0.05    0.01   27
   40      15      0.03       0.03    0.01   27
   50       7      0.04       0.03    0.02-  36 -
   60       1      0.04       0.02    0.01-  36 -
 WEIGHTED COSTS    0.06       0.08    0.01   24
 ------------------------------------------------



BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .47
DRIVER $/KM............ .36        OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR -HIGH END COSTS-$250000
1ST UNIT SEATING CAPACITY.... 61    2ND UNIT SEATING CAPACITY.... 43
1ST BUS $/KM............... .88   2ND BUS $/KM................ .74
1ST DRIVER $/KM............ .36   2ND DRIVER $/KM............. .36
OVERHEAD $/KM.............. 0


          DEMAND WEIGHTED COSTS


 ------------------------------------------------
                        COST/PASS-KM
                 ---------------------------------
 #PASS    %DMD     BASE       TEST    DIFF   %
 ------------------------------------------------
   10      30      0.08       0.12    0.04   49
   20      27      0.04       0.06    0.02   49
   30      20      0.03       0.04    0.01   49
   40      15      0.02       0.03    0.01   49
   50       7      0.03       0.02    0.01-  25 -
   60       1      0.03       0.02    0.01-  25 -
 WEIGHTED COSTS    0.05       0.07    0.02   45
 ------------------------------------------------
```

```
SCENARIO :SMALL OPERATOR-LOW END COSTS-$350000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM............... .57    2ND BUS $/KM............... .4
1ST DRIVER $/KM............ .24    2ND DRIVER $/KM............ .24
OVERHEAD $/KM.............. 0


        DEMAND WEIGHTED COSTS

----------------------------------------------------
                      COST/PASS-KM
                  ----------------------------------
 #PASS   %DMD      BASE      TEST     DIFF   %
----------------------------------------------------
   10     30       0.06      0.08     0.02   27
   20     27       0.03      0.04     0.01   27
   30     20       0.02      0.03     0.01   27
   40     15       0.02      0.02     0.00   27
   50      7       0.03      0.02     0.01-  37 -
   60      1       0.02      0.01     0.01-  37 -
WEIGHTED COSTS     0.04      0.04     0.01   23
----------------------------------------------------



BASELINE BUS
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .4
DRIVER $/KM............ .24        OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR -LOW END COSTS-$250000
1ST UNIT SEATING CAPACITY.... 72    2ND UNIT SEATING CAPACITY.... 47
1ST BUS $/KM............... .5    2ND BUS $/KM............... .4
1ST DRIVER $/KM............ .24    2ND DRIVER $/KM............ .24
OVERHEAD $/KM.............. 0


        DEMAND WEIGHTED COSTS

----------------------------------------------------
                      COST/PASS-KM
                  ----------------------------------
 #PASS   %DMD      BASE      TEST     DIFF   %
----------------------------------------------------
   10     30       0.06      0.07     0.01   16
   20     27       0.03      0.04     0.01   16
   30     20       0.02      0.02     0.00   16
   40     15       0.02      0.02     0.00   16
   50      7       0.03      0.01     0.01-  42 -
   60      1       0.02      0.01     0.01-  42 -
WEIGHTED COSTS     0.04      0.04     0.00   12
----------------------------------------------------
```

```
HLO BUS COST ESTIMATING MODEL

BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .59
DRIVER $/KM............ .6        OVERHEAD $/KM..... 0
SCENARIO :LARGE OPERATOR BASELINE HI-LO COST COMPARISON
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .35
DRIVER $/KM............ .5        OVERHEAD $/KM..... 0


        DEMAND WEIGHTED COSTS


-----------------------------------------------------
                         COST/PASS-KM
                   ----------------------------------
 #PASS   %DMD      BASE       TEST    DIFF    %
-----------------------------------------------------
    15     24      0.08       0.06   0.02-   29-
    30     14      0.04       0.03   0.01-   29-
    40     12      0.03       0.02   0.01-   29-
    50     10      0.05       0.03   0.01-   29-
    60      8      0.04       0.03   0.01-   29-
    70      7      0.03       0.02   0.01-   29-
    80      7      0.03       0.02   0.01-   29-
    90      5      0.04       0.02   0.02-   52-
   100      5      0.04       0.03   0.01-   29-
   120      8      0.03       0.02   0.01-   29-
WEIGHTED COSTS     0.05       0.03   0.01-   30-
-----------------------------------------------------
```

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BASELINE BUS
UNIT SEATING CAPACITY.... 43        BUS $/KM......... .74
DRIVER $/KM............ .36       OVERHEAD $/KM..... 0
SCENARIO :SMALL OPERATOR BASELINE HI-LO COST COMPARISON
UNIT SEATING CAPACITY.... 47        BUS $/KM......... .4
DRIVER $/KM............ .24       OVERHEAD $/KM..... 0


        DEMAND WEIGHTED COSTS


-----------------------------------------------------
                         COST/PASS-KM
                   ----------------------------------
 #PASS   %DMD      BASE       TEST    DIFF    %
-----------------------------------------------------
    15     24      0.07       0.04   0.03-   42-
    30     14      0.04       0.02   0.02-   42-
    40     12      0.03       0.02   0.01-   42-
    50     10      0.04       0.03   0.02-   42-
    60      8      0.04       0.02   0.02-   42-
    70      7      0.03       0.02   0.01-   42-
    80      7      0.03       0.02   0.01-   42-
    90      5      0.04       0.01   0.02-   61-
   100      5      0.03       0.02   0.01-   42-
   120      8      0.03       0.02   0.01-   42-
WEIGHTED COSTS     0.04       0.02   0.02-   43-
-----------------------------------------------------
```